

FEBRUARY 1957 3/-

Business

**PLANNING WORKS
PENSION SCHEMES**

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**HOW ULTRASONICS
CAN HELP YOU**

Progress Report page 80



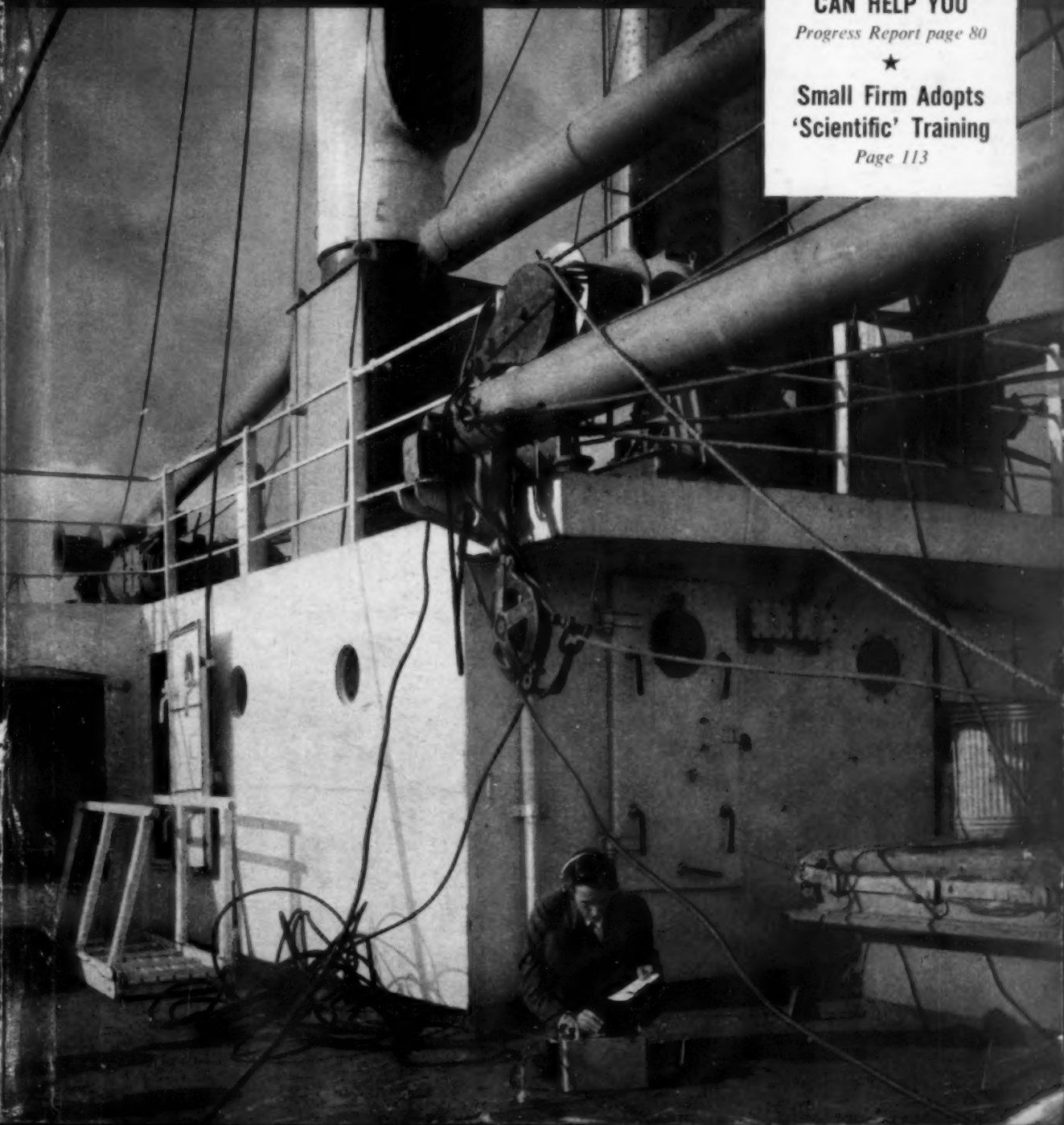
**Small Firm Adopts
'Scientific' Training**

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BUSINESS

Journal of Management

FEBRUARY 1957





ARE YOU AN AQUARIAN?

When you are asked to check up on your last electricity bill, do you realise, however, that if you are subject to a kVA maximum demand or Power Factor penalty clause, you are paying for "idle" current in addition to the current you actually use?

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B U S I N E S S

February, 1957

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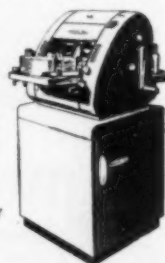


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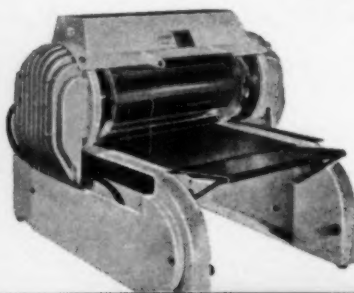
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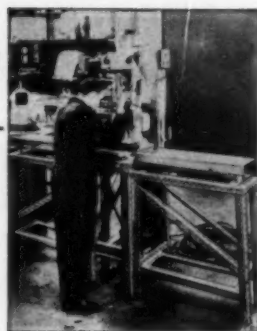
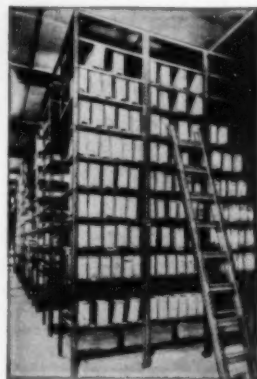
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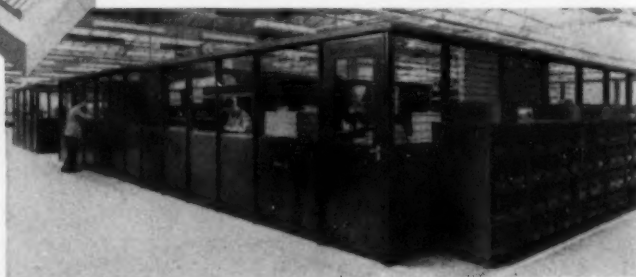
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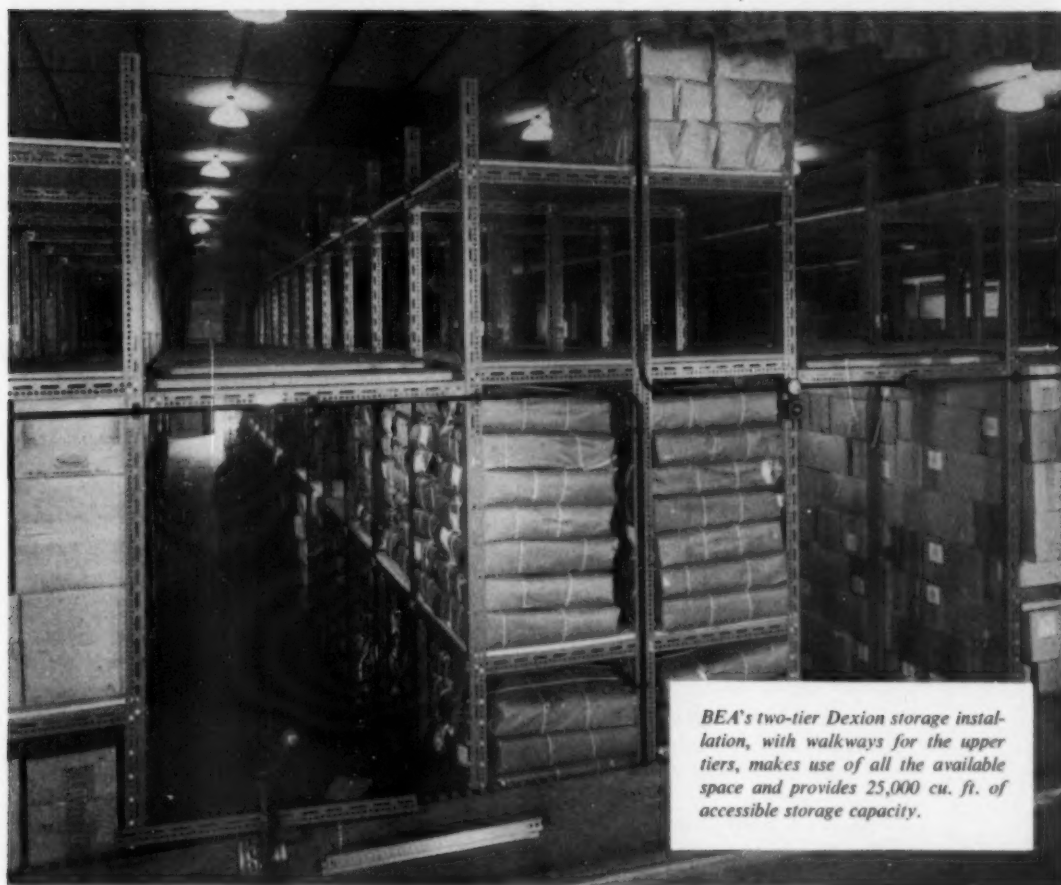
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FEBRUARY, 1957

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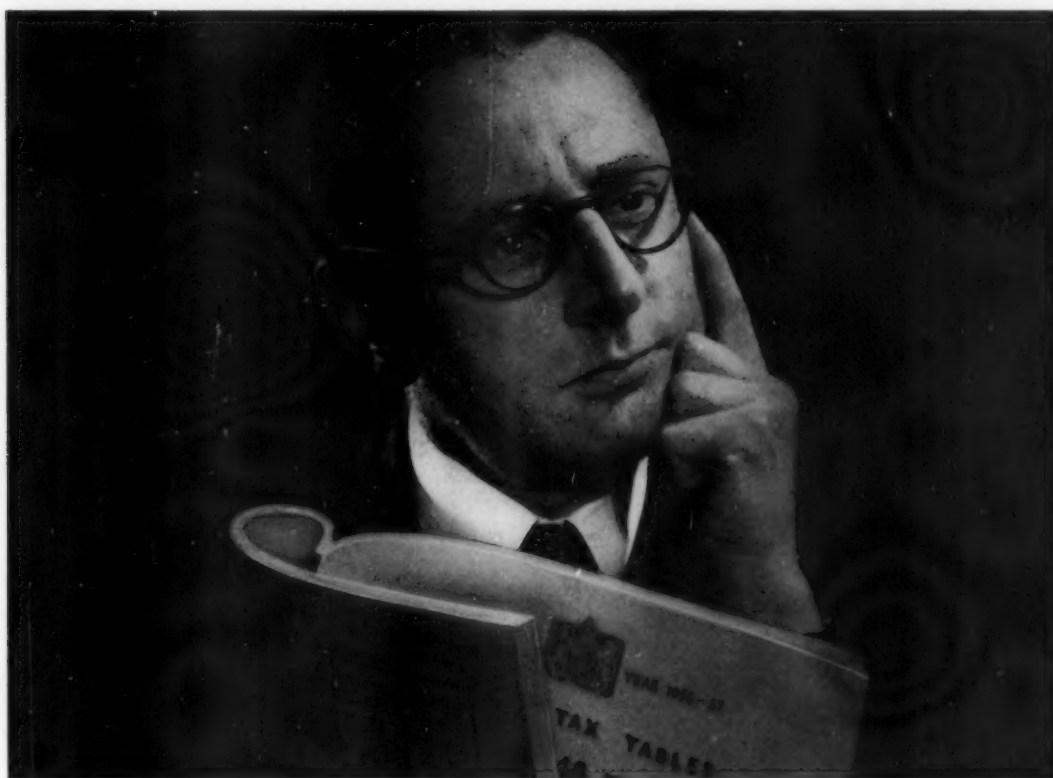
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How good is your mental arithmetic ?

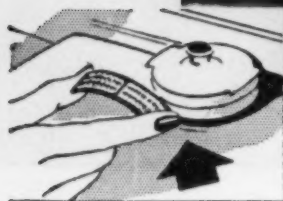
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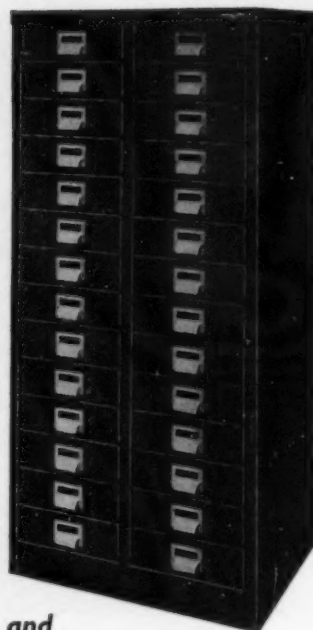
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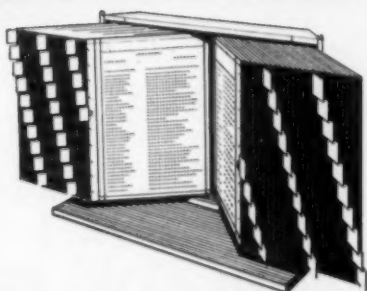


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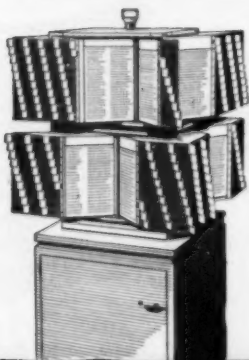
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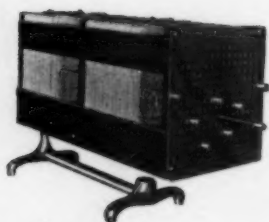
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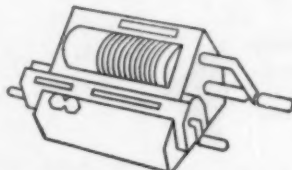
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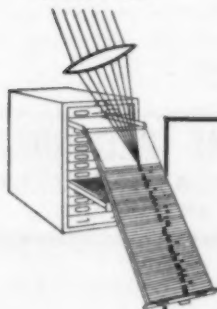
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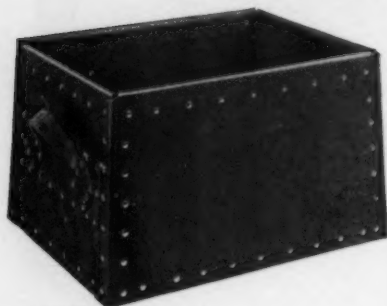
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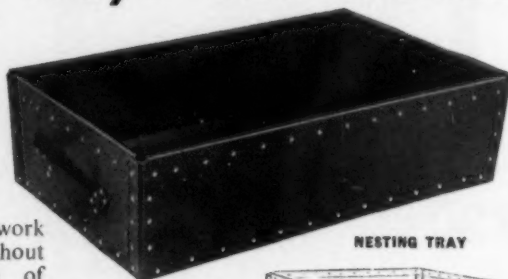
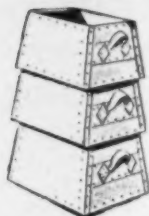
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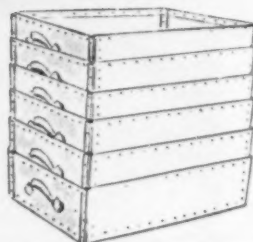
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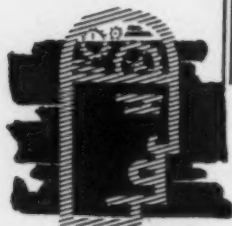
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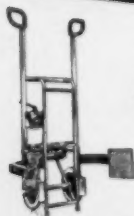
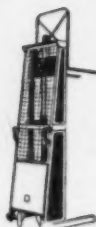
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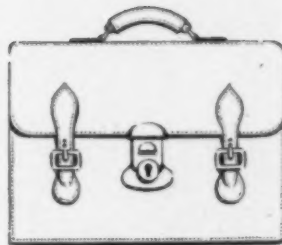
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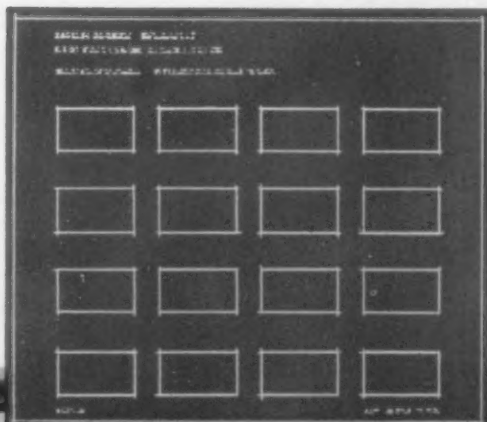
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TGA 77-5

STATE OF THE NATION

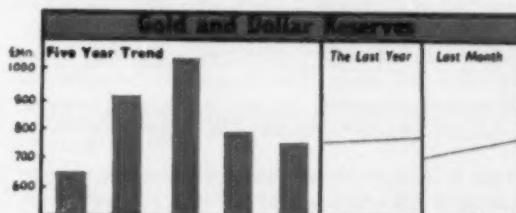
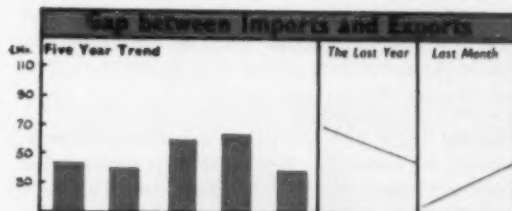
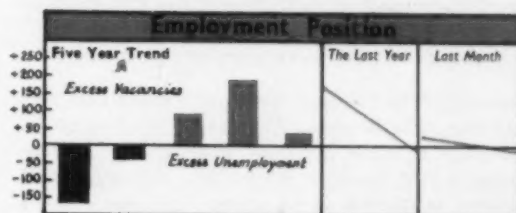
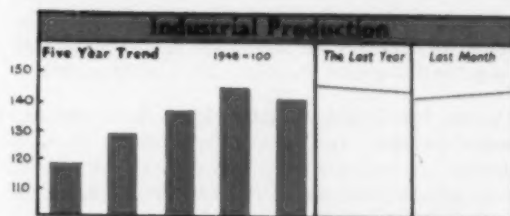
Business outlook brighter • But production unlikely to rise before mid-summer • As forecast here, unemployment now in excess of vacancies, but not likely to increase • Export trade outlook good • Industrial investment declining slightly, but may be matched by rising consumer expenditure and exports • Government expenditure will fall, presaging tax cuts • Retail prices steady, wages rising slowly, raw material prices nearing stability.

Industrial Production is unlikely to increase during the fuel crisis. In the period September to November last year, the average index was 142 (1948 = 100). This was 2 points lower than a year earlier but 23 points higher than four years earlier. Provisional November, 1956, figure of 144.5 shows a decrease on 146 a year earlier.

The Number of Unemployed is now in excess of the number of Job Vacancies. During the three months October to December, 1956, the average number of vacancies was still 27,000 in excess of the number of unemployed, but this was a drop of 144,000 on a year earlier. Four years earlier, in 1952, there were 170,000 more unemployed than vacancies. We have not returned to quite such a state of recession, but we have gone some of the way. For in December, 1956, there were only 279,000 vacancies but 297,000 unemployed.

Gap Between Imports and Exports has recently been quite small. During October to December 1956, average monthly gap was £35.3 million—a fall of £29.7 million on a year earlier, and below the average of £42.6 million four years earlier. In December 1956 the gap was only £42.9 million, which compares with £16.3 million in November and £71.5 million a year earlier.

Gold and Dollar Reserves are now safer. The figures now show the effects of drawing on the International Monetary Fund and of the loan from the Export-Import Bank. During October to December 1956, average level was £756 million, which was less than the £797 million a year earlier but more than the £656 million four years earlier. Peak year was 1954. Between October and November last year the reserves fell £101 million to £702 million, but after strengthening from the I.M.F. and the Export-Import Bank, rose to £762 million.

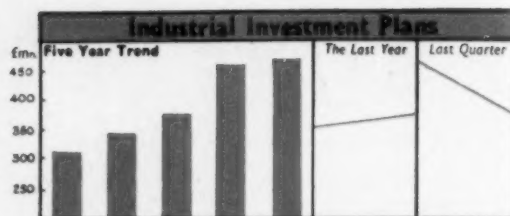


THE CHARTS: Except where otherwise indicated, each bar chart depicts the average monthly value of a particular statistic during the most recent three months, and compares it with the same figure for each of the four preceding years. The earliest year in each case is shown on the extreme left. Under the heading "The Last Year," a straight-line graph depicts the latest month of a particular statistic and compares it with the same month a year earlier. And under the heading "Last Month," the most recent figure is compared with the one for the previous month. In both cases, the earlier figure is to the left and the later figure to the right.

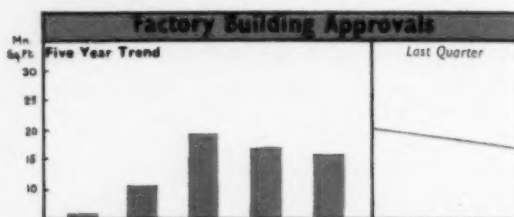
MAIN ECONOMIC INFLUENCES on the STATE OF THE NATION

1. Trends in CAPITAL EXPENDITURE

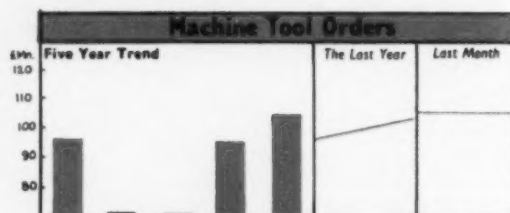
Industrial Investment Plans are large and fairly stable in total. Bars in the accompanying chart show average quarterly expenditure for years 1952 to 1956. The 1956 average is estimated to have been about £446 million, an increase of 21 per cent on 1955 and an increase of 59 per cent on 1952. Provisionally, the Board of Trade survey shows that 1957 capital expenditure may be slightly lower than 1956. In the third quarter of last year, expenditure by manufacturing industry was 13 per cent higher than a year earlier.



Factory Building Approvals have declined. During fourth quarter of 1956, total area approved was 15.1 million sq. ft., which compares with 17.2 million a year earlier and only 5.9 million four years earlier. Peak was in the early part of 1955, when 24.0 million sq. ft. were approved in the first quarter and 29.7 million in the second.



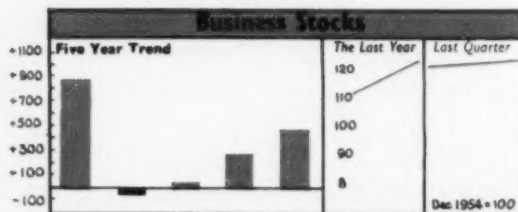
Machine Tool Orders have fallen slightly, but outstanding orders are high. Average volume of orders on hand during July to September, 1956, was £104.0 million, a considerable increase on £95.5 million a year earlier and also on £97.0 million four years earlier. In September 1956, volume of orders on hand was £102.9 million—equivalent to over 16 months' deliveries. But orders fell from £9.6 million in February to £6.2 in August.



Industrial Hire Purchase has recently shown both falls and rises. The accompanying chart is based on figures collected by Hire Purchase Information. Average monthly H.P. contracts for new cars and commercial vehicles in October to December, 1956, was 7,000, a decline on 12,900 a year earlier but a great increase on 3,700 four years earlier. The Board of Trade index for H.P. financing of industrial plant and equipment was 101 in November 1956, a rise of 18 points on October but 19 points below a year earlier.



Material Stocks have lately risen in both manufacturing industry and commerce. Bars in the chart show changes in value of stocks during the years 1951 to 1956. Graph lines show changes in the index of manufacturing stocks compiled by the Board of Trade. Manufacturing stocks index for the end of September, 1956, was 122½ (1954 = 100), which compares with 111 a year earlier. Non-manufacturing stocks index (December 1954 = 100) was 95 in September 1956, a rise of 4 points on June but a fall of 12 points on the previous December.



Home Building Starts have declined. Permanent houses started in the third quarter of 1956 totalled 70,407 compared with 87,787 a year earlier and 85,600 four years earlier. Number under construction at September 30, 1956, was 288,572, which compares with 302,530 a year earlier.



2. Trends in CONSUMER EXPENDITURE

Retail Sales outlook is cautious but better than a month ago. During September to November, 1956, the average index of retail sales was 152, which compares with 147 a year earlier and 119 four years earlier. Allowing for price increases, the volume of sales has shrunk slightly in the last year. In November 1956, the index was 161, which compares with 152 for October, and 154 for November, 1955.

Hire Purchase has increased recently, except in the case of motor vehicles. The accompanying chart shows the trend of H.P. sales of used cars. Average monthly number of contracts during the period October to December, 1956, was 22,900, a decrease on 30,600 a year earlier but much greater than the 10,100 four years ago. The Board of Trade index for H.P. sales of domestic equipment rose from 88 to 93 between October and November last year, but it was 106 in November, 1955.

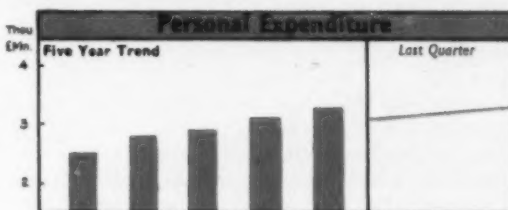
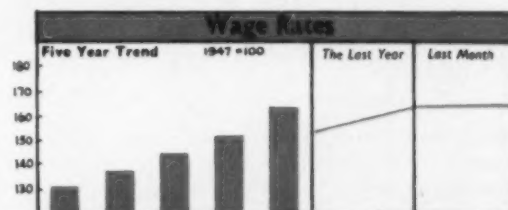
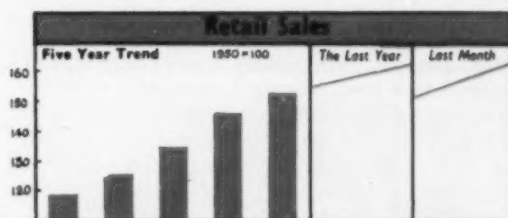
Weekly Wage Rates have begun to rise again, but not so drastically as a year ago. Claims are likely to be settled at no more than a 3 or 4 per cent increase. In the period September to November 1956, the average index of weekly wage rates was 165 which compares with 153 a year earlier and 132 four years earlier.

Personal Expenditure is not even keeping pace with price increases. In the third quarter of 1956 it was £3,399 million, compared with £3,288 million a year earlier and £2,709 million four years earlier. This represents an increase in spending of 3½ per cent in the latest year, at the same time that prices have risen 4½ per cent.

3. Trends in GOVERNMENT EXPENDITURE

Payments from Exchequer are so far this year running about £330 million ahead of the same period last year. But expenditure will decline under renewed Government plans to economize. Between 1951 and 1955, Government expenditure increased by 25 per cent and prices rose by 19 per cent, so that expenditure in real terms rose by 6 per cent. Expenditure in the current financial year is estimated to reach £4,683 million.

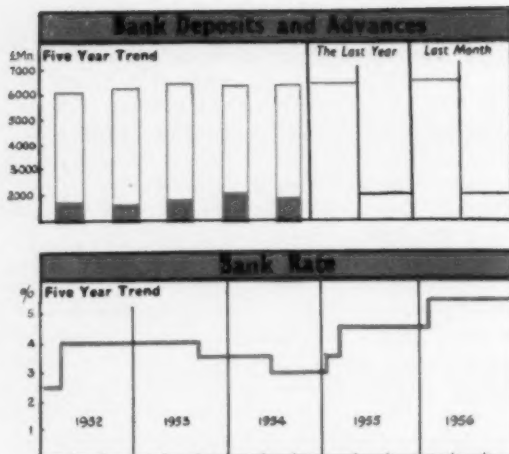
Budget Deficit so far this year is about £200 million more than at the same time a year ago. The accompanying bar chart shows the Budget surpluses in calendar years 1951 to 1955. These are the above-the-line surpluses. The graph line compares the current financial year with the previous one. This financial year's above-the-line surplus was budgeted to be £484 million.



4. Trends in MONETARY AND FINANCIAL POLICY

Bank Deposits have recently fallen slightly, while **advances** have risen. During September to November 1956, average level of bank deposits was £6,400 million. This was similar to the level a year earlier, but a rise on £6,200 million for the same period of 1952. Bank advances during September to November 1956 were at an average of £1,900 million, a decrease on the £2,000 million a year earlier but a rise on £1,700 million four years ago.

Bank Rate may be reduced slightly in the near future. The accompanying chart shows the movement of bank rate since the beginning of 1952. In March of that year, it was raised from the long standing rate of 2½ per cent to 4 per cent. It later went down to 3 per cent but is now 5½ per cent.



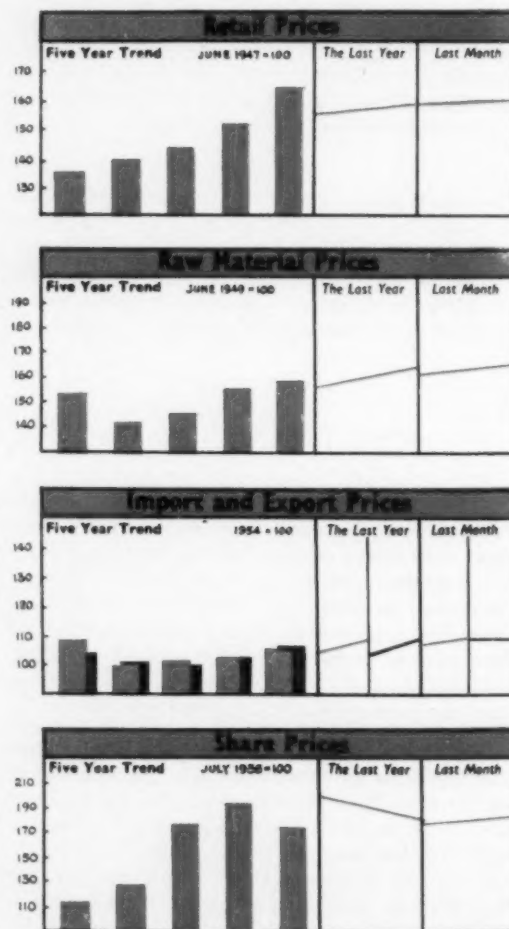
5. Trends in MARKET BEHAVIOUR

Retail Prices have now been fairly steady for eight months. In the period September to November 1956, the average level of the old retail price index was 158, which compares with 152 a year earlier and 137 four years earlier. The index for November 1956 was 159, or one point above October and 4 points above November 1955.

Raw Material Prices have lately risen. Average level of the index of basic materials used in non-food manufacturing industry during the months October to December 1956, was 158.6. This compares with 153.8 a year earlier and 153.0 four years earlier. In December 1956, the index was 161.1, a rise of 1.8 points on November and an increase of 5.8 on a year earlier.

Import Prices have lately risen and **Export Prices** have been steady. During the three months September to November 1956, average level of the import price index (1954=100) was 106 or 3 points higher than a year earlier but 3 points lower than four years ago. In the three months September to November 1956, average level of the export price index was 107. This was 4 points higher than a year earlier and 4 points higher than four years ago. In November 1956 the import price index rose 1 point to 107 and the export price index was steady at 107.

Share Prices have recovered from the Suez crisis. During the period October to December 1956, the average level of the *Financial Times* index of industrial ordinary share prices was 173.7. This represented a big fall from the level of 191.5 a year earlier but a large rise on 115.0 four years earlier. In the middle of January 1957 the index was around 181, or well above the December average level of 174.0.





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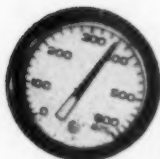
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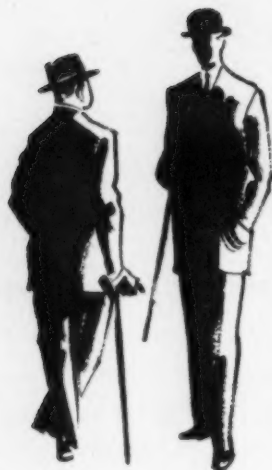
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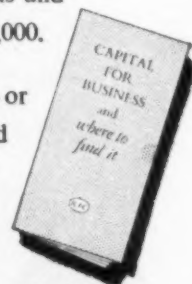
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HOME MARKET SURVEY

A Round Britain Survey: Regional Notes on Markets and Industrial Developments

EASTERN

THE setback in car sales following the introduction of petrol rationing has brought an end to Ford Motor Co.'s 20-year-old record of full employment. Since the Suez crisis some 2,400 workers have been dismissed at the Dagenham works of their subsidiary company, Briggs Motor Bodies, where four-day week working has been resumed.

Ford are, however, looking forward with confidence. Their optimism is based on their sales record over the past 12 months, during which 154,000 cars, commercial vehicles and tractors—worth £55 million—were exported.

Particularly significant, in view of the shrinkage of European markets affected by petrol rationing, is the extent of Ford success in the dollar area. In the last quarter of the past year, 5,000 cars were shipped from Dagenham to the U.S.; and over the year sales of cars, vans, tractors and parts to North America totalled \$20 million.

Work continues on the £65 million Ford expansion scheme. The £1.4 million spare parts depot at Aveley was completed some months ago, providing 360,000 sq. ft. of warehouse space for £2.5 million worth of spares and 52,000 sq. ft. of office accommodation. The new £5 million foundry building at Dagenham will turn out large tractor castings and cylinder blocks and heads, while the new £2.4 million plant at Basildon will be able to produce some 70 tons of machine parts and 2,400 radiators daily. The opening of the Borg-Warner works at Letchworth has made available to British manufacturers the company's automatic transmission equipment and automatic overdrive.

A new crude distillation unit, which will almost double the capacity of the refinery, is planned by Shell Petroleum to come on stream at Shell Haven by the end of next year.

Last year the group brought into operation at Shell Haven a platforming unit—erected at a cost of £2.5 million—which produces a high octane component for blending into motor spirit. In November, they opened a £1.6 million alkylate plant, with an annual production capacity of 30,000 tons. Alkylate is the raw material from which powdered domestic synthetic detergents are made.

I.C.I.'s research facilities at Welwyn Garden City have been substantially extended by the opening of a £500,000 technical service and development building with a staff of 200. Provision has been made for this

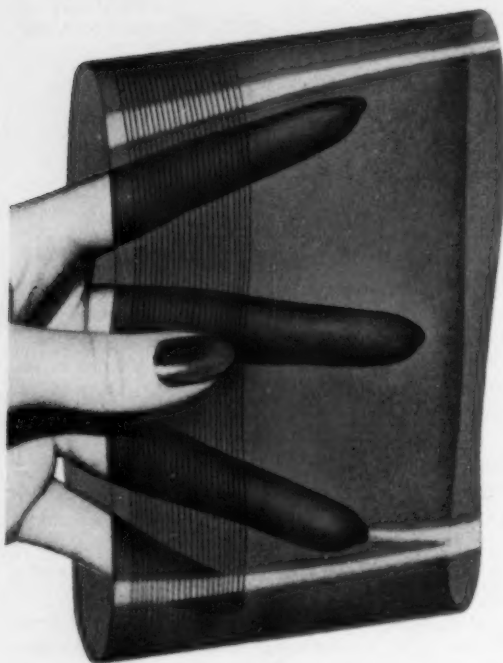
number to be doubled as required. New laboratories have been provided for experiments with plastics end products, and machinery has been installed for processing plastics raw materials. Other sections of the building are equipped with plant reproducing the manufacturing conditions of the firm's customers.

A new testing and proving laboratory will be a feature of the Billericay equipment storage depot of Humphreys and Glasgow. Development work is also carried out at the depot where construction material and equipment is mechanically handled. The special catalyst used in the Onia-Gegi oil-gas process is now stored there in bulk.

The electronics division of Murphy Radio, Welwyn Garden City, are working on an order for 16 colour television receivers, of which the B.B.C. will take 12 and other authorities (including the G.P.O.) the remaining four. The sets, which are being made by hand, are based on a design prepared by the firm's domestic television-radio laboratories. Pye Ltd., Cambridge, whose policy over the past 18 months has been to build up those sides of their business not concerned with the popular TV and radio set market, report encouraging progress. Pye's scientific instrument companies have expanded, communications trade has grown and par-



The vertical line at 100 represents the national average level of retail trade for the latest month (November). Against this average the performance of each region may be measured



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ECONOMIC PROSPECT

ticular success has been achieved by the TV camera and transmission division.

Of the future, C. O. Stanley, the chairman, comments: "There is a great increase in the demand for television cameras for industrial purposes and it is obvious that as automation evolves the **industrial TV camera** will play an ever-increasing part in many automation schemes." Pye Marine, of Lowestoft, plan to increase their export business, following their 13,500 sq. ft. factory extension.

E. K. Cole are forming a new company to take over the marketing of Ferranti's range of domestic radio, radiogram and TV receivers. Laurance, Scott and Electromotors Ltd., Norwich, are finding that the growth of **automation** in industry has underlined the demand for specialities such as their A.C. variable speed motor and associated switchgear.

Despite rising prices and increasingly keen competition overseas, **agricultural machinery** makers are pressing ahead with development work. Rotary Hoes Ltd., West Horndon, have recently completed orders for Japan for a novel **tracked vehicle**. It is designed for work on a large bog reclamation scheme which is being financed by the World Bank, and further orders have been received from China.

Ransomes Sims and Jefferies Ltd., Ipswich, have, with consultants' help, been completely overhauling their production, stock control and buying procedures, and are devoting attention to simplifying designs and varieties of plant to achieve more economical line production. Edgar Percival Aircraft, whose new EP9 **aircraft** for farm work has already been ordered by New Zealand and Australian firms, plan to produce 150 machines this year.

Considerable expansion, on both the research and manufacturing sides, is projected by Fisons Ltd., of Felixstowe. Good progress is being made with the £4.5 million project for a nitrogenous **fertilizer plant** near Shell Haven and the first stage of manufacture should be achieved by the autumn of next year. As a result of the growth of their horticultural trade the company are erecting a new modern manufacturing and packing plant at Bramford, near Ipswich.

Improvements have been made by Fisons Pest Control Ltd. on the production and contracting service sides, and efforts are being made to extend overseas business. A joint company is to be formed with the Tata group for the manufacture and sale in India of **pest control chemicals**. Production on a small scale has also been established in Ceylon in conjunction with Harrisons and Crosfield.

A subsidiary concern, Whiffen and Sons Ltd., who last year developed a new type of expanded p.v.c., have completed a new plant for the synthesis of theophylline, an important **medical chemical** which is now

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being produced commercially for the first time in Britain. In addition to chemical and physical laboratories at Fisons' new Leverton, Suffolk, research station, engineering facilities have been provided for exploring new developments in all aspects of fertilizer technology. To match their increased research work the company are building up their development organization and the first stage of a major expansion programme at Bramford is already operational.

The D.S.I.R.'s Low Temperature Research Station at Cambridge is undertaking a new programme of research into the **sterilization of foods** with radiation from fission products of radioisotopes. Members of the scientific staff of the Metal Box Co. and the British Food Manufacturing Industries Research Association have been seconded to work on this project.

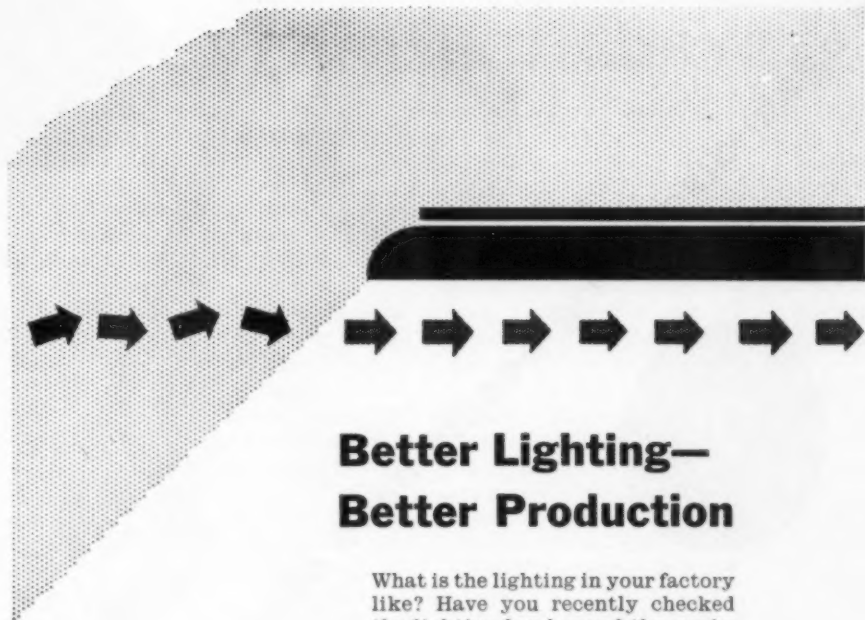
Demand for **quick-frozen foods** continues to grow, and firms in this field are expanding their activities. Last July, Birds Eye Foods, a Unilever associated concern, opened a new cold store at Great Yarmouth; it is claimed to be the largest quick-freezing factory in the world outside the U.S. Capacity is 2,500 tons, and this is to be extended to 3,700 tons to meet market requirements. Loading and despatch are fully palletized. The firm merged at the beginning of the year with another Unilever associate, Smethursts, whose Grimsby factory is to be considerably enlarged.

Crosse and Blackwell (Holdings) Ltd., who are now in their 251st year of continuous trading, are operating their new Colchester factory: it is capable of further development. As a result of the establishment of a new refinery for **edible oils** at Bromborough, the potential output of Van den Berghs and Jurgens' Stork margarine plant there has been increased by 50 per cent. Allen and Hanburys Ltd. have completed a new **sterile products** building at Ware.

To meet increased demand for **gas turbines**, Ruston and Hornsby Ltd., Lincoln, have put into operation a new test shop with facilities for the simultaneous testing of six turbines. They have also established a new research station with modern machinery and instruments. Their industrial gas turbine is to be built under licence by the U.S. firm of Clark Bros. in a new plant to be established in Western New York State.

Engineering and Lighting Equipment Co., St. Albans, report considerable expansion in work undertaken by their new **gravity die-casting** foundry. The firm's tool room has been expanded and a new pattern shop brought into commission.

The Mentmore Manufacturing Co. are planning to move to their new factory in Stevenage New Town certain departments that have been operating hitherto in various parts of London. British Ropes Ltd., who have bought and re-equipped a ropeworks in Grimsby, are specializing there in the production of **fibre ropes** for the fishing industry.



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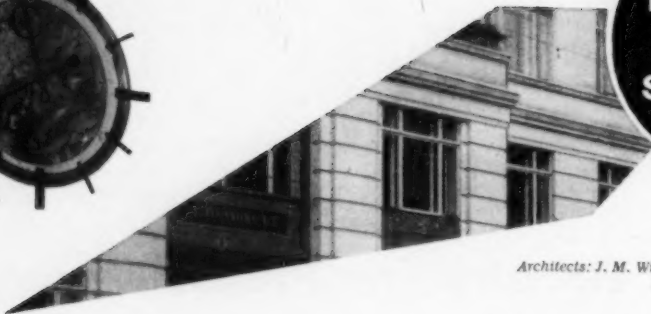
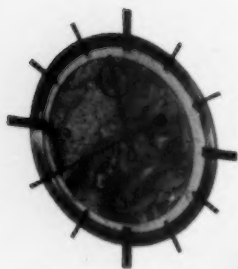
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EXPORT MARKET SURVEY

A Round-the-World Survey: Country by Country

BURMA

OVER the past four years Burma has had to learn one painful and expensive lesson—that Pyidawtha, the Welfare State, cannot be built on rice alone.

In 1952, when world rice prices were soaring, the government, which was deriving 75 per cent of its total foreign exchange income from rice sales overseas, understandably felt encouraged to embark on an ambitious national economic programme. But in the immediately following years, rising development outlays, coupled with continued high expenditure on internal security and a dip in the price of rice, led to a serious drop in Burmese reserves. In 1955 expansion schemes were drastically curtailed. Imports were controlled, many major projects were deferred and attention was concentrated particularly on agriculture and on private investment, especially in joint public and private ventures.

With her policy of political neutralism, Burma is in the process of evolving a new trading pattern in which the State plays a dominant role, and barter deals with Communist countries have increased. Over the past 12 months, 'package' agreements have been concluded with Russia, Czechoslovakia, East Germany, Hungary, Bulgaria, Poland and China.

British exports to Burma, which totalled £23 million in 1955, dropped by 40 per cent in the first quarter of last year. The Burmese premier, U Ba Swe, has spoken of the need for re-alignment of U.K. trade policy "in the light of prevailing conditions in resurgent Burma." On the British side, the suggestion has been made that, as nearly all Burma's cash earnings come from the sterling area, sterling exporters should be allowed to compete more freely in the market.



Burma needs considerable external financial backing and it is becoming clearer that a continued flow of U.K. investment is dependent on the conditions offered to capital—including adequate remittance facilities for skilled men brought into the country for specific projects.

The chronic shortage of technicians and trained personnel is one of Burma's main problems. It has been partly met by the provision of over 50 experts through the U.N. Technical Assistance Programme, and by the granting of training facilities overseas under the Colombo Plan to over 200 students.

The other World Bank loan—for \$5.4 million—is earmarked for railway rolling stock and bridge-building materials. It forms part of a \$35 million rehabilitation scheme involving the relaying of 200 miles of track, the repair of 50 minor bridges and the construction of a new bridge across the Sittang river, thus linking Rangoon with south-east Burma.

The 1,800-mile rail network, radiating out from Rangoon, covers the agricultural zone and reaches most of the mineral areas up to the forest fringe. Traffic is still only about half the pre-war volume, but a big improvement is expected by 1959, when more freight cars and passenger coaches will be in service and heavier rails will be laid. A Yugoslavian plant has just completed an order for 100 wagons.



Now under way is a major electrification programme: to date well over 200 towns have been provided with power. By next year it is planned to have available new hydro-electric capacity of 84,000 kW to serve the Rangoon and Mandalay areas, and turbo alternator and diesel generating capacity of 35,000 kW.

Better power supplies will stimulate the development of small-scale industry, to which the government attach great importance. Already pilot plants have been set up for condensed milk, pottery and hand paper-making; new schemes include electroplating and anodizing plants, dry cells, accumulators and lacquer ware.

A new jute mill at Thamaing is scheduled to produce 24 million bags a year; two new sugar mills at Namti and Pyinmana have sufficient capacity to render the country self-sufficient in sugar; and the new German-built steel mill at Ywama near Rangoon has a potential annual output of 16,000 tons of light steel products and 40,000 tons of re-rolled steel.

Total agricultural production is now about 85 per cent of pre-war figures. Increased productivity is being ardently sought, while efforts are being made to decrease the dependence on rice by cultivating more diversified cash crops, such as cotton pulses, beans and fruit. Given steady prices, the outlook for Burma is promising, with export sales paying for a fair import programme and yielding a margin for the servicing of foreign loans.

Capable of taking 1,000 students, the new £2.5 million Rangoon University Engineering College was formally opened last November. For this project, Britain has given £40,000 worth of books and equip-

A la carte!



Very enjoyable, foreign travel. But you need to know the ropes. Otherwise you're likely to find yourself *à la carte* (which is fractured French for 'in the cart'). Fortunately for travellers, we know the ropes, at least so far as they concern money matters and exchange regulations. And we've put a lot of helpful information on these subjects into a booklet called 'The Joys of Travel'. There's a copy waiting for you at any branch of . . .

MIDLAND BANK LIMITED

HEAD OFFICE: POULTRY, LONDON, E.C.2

ECONOMIC PROSPECT

ment and is paying the salaries of three British lecturers. Other training establishments opened in 1956 included the Polytechnic Institute, the Agricultural Research Institute and a technical institute at Insein.

Sponsored by the Ford Foundation and staffed by U.N. and U.S. experts, a management accounting project is running under the Ministry of National Planning. Accounting experts are assigned to the various government boards and co-operatives with a view to revising existing methods, installing new cost accounting systems and training staff in accounting practice.

The Engineering College was completed in two years by Taylor Woodrow Construction and United Burmese Engineers to plans by Raglan Squire and Partners, of London. Several well-known British companies have been called in to carry out development projects. Evans Medical Supplies Ltd., of Speke, have been responsible for the establishment of a Burmese pharmaceutical industry which will, when finally completed, comprise a main plant, a biological institute for the preparation of sera and vaccines, an ethyl alcohol distillery and a medicinal yeast unit. The main contract was secured by Holland and Hannen and Cubitts.

Lipton Ltd. have entered a joint venture with the Burmese government to set up and operate a new tea factory at Mandalay. Powell Duffryn Technical Services Ltd. have had the considerable task of opening up the Kalewa coalfield—designing and installing equipment, and operating and maintaining the plant while local technicians are being trained. Output this year is expected to reach 1,000 tons a day.

With the government, the Burma Oil Co. operate the Chauk refinery and have built a new refinery at Syriam. Currently they are prospecting for new and unexploited petroleum deposits in the Irrawaddy delta. Another joint venture agreement has been signed by Anglo-Burma Tin Co., who hold a number of leases in the Tavoy district, including the Heinda tin mine.

Although internal insecurity has slowed down transport and communication schemes, considerable progress has been made. In the past ten years the inland waterway fleets have been rehabilitated and shore and maintenance facilities extended. The country's sea ports, which suffered much damage in the war, have been largely restored (although they still operate at less than pre-war capacity) and air transport has grown.

Two important loans have been granted to Burma by the World Bank. One of them—for \$14 million—is to finance the reconstruction of cargo berths and storage facilities at Rangoon port, which handles four-fifths of the country's foreign trade. As rice, timber and mineral exports increase there is an urgent need for improved turn-round time, and quantities of tractor-trailers, fork-lift trucks, cranes and other handling equipment are to be purchased.

TIME CONTROL AND SYNCHRONISED CLOCKS	 Fully Automatic Time Recorder	 9 in. dia. general purpose Clock	 Office Clock	 Job Time Recorder
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**.. and the
INTERVAL TIMER
is New!**

First in the field again - the TR Interval Timer is unique. It is now possible for the tea break signal to be sounded departmentally with the arrival of the tea trolley at whatever time it may arrive. When the trolley reaches his department the Foreman or deputed person turns a key on the control point and this sounds the break signal within the department. After the desired interval the two-minute pre-resumption warning and then the start work signal both sound automatically.

Originally designed to meet a Subscriber's specific need it is now available for the benefit of Industry generally as one of the TR Services. You are invited to send for full details of this new time saving equipment.

*TR SERVICES are available on a rental basis. Details of any of the above equipment will gladly be sent on request.

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FEBRUARY, 1957

57

TREMENDOUS ADVANCE IN MICROFILMING!

BURROUGHS CUT COST AND INCREASE EFFICIENCY



* British made for Burroughs by Rank Precision Industries (BAF) Ltd., to Bell and Howell design.

Now—Recorder and Reader in one compact unit

Burroughs Micro-Twin* combines a recorder, which photographs all documents fed into it, and a reader, which screens documents you want to refer back to.

The price of this combined unit is less than you would expect to pay for the recorder alone.

Because both sides of a document can be photographed simultaneously, film is economized.

Because the same lens is used both for recording and reading, you can have documents screened by turning the control knob to "read."

Does it take a long time to trace the documents you want to screen?

The exclusive indexing meter is the latest development in document location; it allows for 999 indexings per 100 feet of film. A document can be found within seconds. Facsimile prints can be made without a dark room.

Microfilming keeps your records, saves time, money, and office space, but the Burroughs Micro-Twin does it all more efficiently, more economically than ever before.

Visit your nearest Burroughs office for a demonstration. Head Office: Burroughs Adding Machine Limited, 356-366 Oxford St., London, W.1.

Burroughs MICRO-TWIN

The most experienced manufacturers of Adding, Calculating, Accounting, Typewriter-Accounting, Statistical and Microfilm Equipment



Enterprise

MARCH OF BUSINESS

IDEAS AND ACTIONS OF FORWARD-LOOKING EXECUTIVES

HOT NEWS STORY

WHEN people talk about the techniques of 'putting employees in the picture', they are generally thinking of the difficulty of presenting financial information and production figures in a palatable form. Yet these, on their own, seldom give a complete picture of any business activity.

From time to time firms may have a chance to 'go to town' on much more lively issues. A good example is a front-page story in the December issue of *Lyle and Scott News*, the pioneer house-journal-in-a-local-newspaper. Under the headline "Lyle and Scott Spurns Mystery Takeover Bid—Mr. C. D. Oliver's Tribute to Workers," it injects a note of drama into routine company news.

The opening paragraph says: "Through the steadfast loyalty and devotion of Lyle and Scott shareholding employees, a powerful bid by secret financial interests to gain complete control of the company has, after a seven-weeks struggle, been repulsed."

Five years ago the employees who held shares voluntarily founded a "Lyle and Scott Club." Today its members—directors and employees—represent two-fifths of the company's 64 shareholders.

The take-over struggle began in November last year when an anonymous bidder, acting through a firm of solicitors, offered £2 10s. for each £1 share. Later this figure was raised to £3. Some of the shareholders outside the company were prepared to sell. But the members of the 'club' unanimously rejected the offer which, says the newspaper report, was "in defiance of the wishes of all of us here in Hawick, whether executives, workpeople or ordinary folk in the street."

Because of this, the mystery bidder

"has absolutely no chance of buying the 75 per cent necessary if he is to obtain complete control and alter the articles of association."

The management of Lyle and Scott are to be congratulated on the imaginative way in which they have presented the facts to their employees and to other members of the community in which they operate. By overtly attributing their victory to the loyalty of a group of workpeople they have scotched any idea that the directors' attitude was based wholly on self-interest.

At the same time they have given the mystery bidder a pretty firm indication that it is not their intention to climb down at a later date.



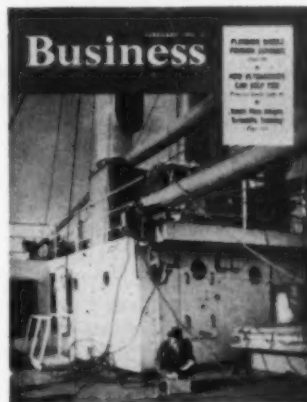
This year's Business Efficiency Exhibition—at Olympia, London, from June 20 to 27—will be the biggest ever staged. No fewer than 130 firms will be showing products ranging from paper clips to electronic computers. All the available stand space has been booked for some weeks.



'SOUND' TECHNIQUES

ULTRASONIC techniques have made much progress in the past few years. From the laboratory stage, they have become tools accepted by many industries, as described in an article on pages 80-85. Teething troubles have gradually been overcome: so have some of the effects of 'over-selling' in the early days.

One application of ultrasonics has even won the qualified approval of Lloyds. This is the use of an ultrasonic gauge to measure the effects of corrosion on ships' plating—a cheaper, quicker, and more satisfactory method than the traditional process



In shipyards—and in precision industries—ultrasonic tools are finding new uses (see this page)

of drilling large numbers of holes for the insertion of conventional gauges.

In the course of experimental work Shell Tankers Ltd. found that an ultrasonic gauge was accurate to 0.005in. for thicknesses between 1in. and 1in. It is unlikely that the drilling technique will be entirely eliminated, but experience shows that it may be reduced by 80 per cent.

In the U.S.A. ultrasonic gauging is accepted to a greater extent, and several firms undertake surveys of

Next Month

JUNIOR BOARDS. Critical analysis shows why some of them succeed and others flop.

SPARK MACHINING. How tough metals can be cut with soft 'tools' which never touch the work.

ships and large installations on a contract basis.

This month's cover picture shows a Dawe Instruments' ultrasonic thickness gauge being used to check the plating of a ship.

★ ★ ★ *recruits*
Industry wants ~~products~~ more than ever—but finds that many of those it gets are dull. R. Peddie, secretary of the United Steel Companies, told the Oxford Conference for Schoolmasters last month. He blamed over-specialization in both scientific and non-scientific subjects for the large output of young men with plenty of practical knowledge but no originality of ideas and very little interest in matters outside their own field.

The real need was for men with a broad, flexible outlook and a genuine interest in human beings—men who would accept responsibility. Mr. Peddie suggested that the effects of over-specialization could be corrected by broadening the school curriculum, lowering the standard of academic attainment in specialized subjects at advanced level, and balancing these changes with increased specialization at the universities.

★ ★ ★ SPRATS TO CATCH WHALES

BACK from a round-the-world tour, Lawrence Robson, chairman of Associated British Engineering, tells British industry how it can "thrust forward in the race for the development of the Commonwealth and the politically stable areas of Asia."

The key point in the programme which he envisages is that British firms should finance pilot schemes of great potential. After their initial success, longer-scale developments would follow naturally.

As an example Mr. Robson cites the operations of General Motors in Australia. He explains: "Out of the profits from a preliminary scheme, this local company have become a £100,000,000 car empire, and now produce nearly half the country's total car requirements."

"Here is a pattern for success. The way is open for British industry to

come in on the ground floor of a 50-year programme."

Out-moded, in Mr. Robson's view, is the longstanding formula of exchanging British manufactured goods for Commonwealth raw materials. What is needed today, he says, is for British know-how to establish—in every sense—primary and secondary industries.

★ ★ ★ *or*
A series of training and appreciating courses in the use of the American-built Univac 11 electronic computer has been arranged for British businessmen. 'Top management' sessions consist of one or two days in London, Bristol, Manchester, or Glasgow, with the option of one day at the European computer centre opened a short time ago in Frankfurt. In addition, there are separate courses for senior executives, junior executives and programmers, who will spend part of the time in London and part of it in Frankfurt.

★ ★ ★ COST-CUTTING TECHNIQUE

SHORT Brothers and Harland Ltd. of Belfast have developed a new machining technique which, if generally adopted, "can reduce substantially the production and overhead costs of the British engineering industry."

Described as a "revival of the old-fashioned gun drill," their technique is a remarkably efficient method of reaming—of enlarging, to extremely accurate standards, holes pre-drilled in metal. Short's say that it is from 40 to 60 times as fast as standard reaming methods. At the same time it imparts a high standard of finish.

The new tool has a single tungsten-carbide-tipped cutting edge. This is supported by two 'stabilizing wear pads' which ensure that the hole is reamed to consistently accurate dimensions. Standard reaming tools have from four to eight cutting edges, making their maintenance both difficult and expensive.

Shorts are now using their new methods in the production of aircraft undercarriage components, wing root fittings and rudder bars. They find,

for example, that a hole 1in. in diameter and 4in. deep can be reamed in 24 seconds. Using standard methods, this job would take 20 minutes.

Letters

Sir,

I was very glad to see that you found the report on 'Management Data Needed by Different Types of Company,' presented by Mr. H. L. Bingham at our recent National Conference, interesting enough to be printed in large extracts.

Your readers may like to know that the practical work on this subject, which has been carried out for some years by Mr. L. Taylor Harrington and myself, with the help of a general committee chaired by Mr. John Ryan and a steering committee chaired by Mr. A. R. Smith, is still continuing. At present we are engaged in testing the validity of the six types of firms outlined in the article by sending the paper to a great number of member firms of the Institute, asking them to say which of the types of firm described is most similar to their own, and whether they in fact obtain and use the management data stated to be necessary for that type.

This work, which will lead to an early publication containing a number of detailed case studies, has now reached the stage where we can offer an advisory service to British industry. In order that this advisory service shall be as effective as possible, we feel that it is most important to obtain information on the practices of as wide a range of firms as possible, and we should therefore be very glad if those of your readers who saw the article on page 84 of the January issue would get in touch with this division of the Institute.

H. INGHAM,
Manager, Management
Economics Division
British Institute of Management,
8 Hill Street, London W.1

★ ★ ★
Sir,

I have read with interest your article in the December issue of

With the

EMIDICTA

DISC OFFICE RECORDER

It's **CHEAPER** for you!

- Operating costs practically negligible.
- Inexpensive, flexible, unbreakable discs with indefinite life.
- The Emidicta typist can turn out more letters than the average shorthand typist, and at half the cost!

It's **FASTER** for the typist!

- Tone control adjustable to individual taste.
- Adjustable playback speed, allied to clear 'spot-on' indexing, simplifies transcription.
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It's **EASIER** for the dictator!

- Nothing easier to use than the Emidicta with its simple two-lever microphone giving complete control of recording.
- Push-button indexing.

In certain conditions even greater economies can be achieved with the Emidicta Network System. Ask the advice of the Emidicta Advisory Consultant.



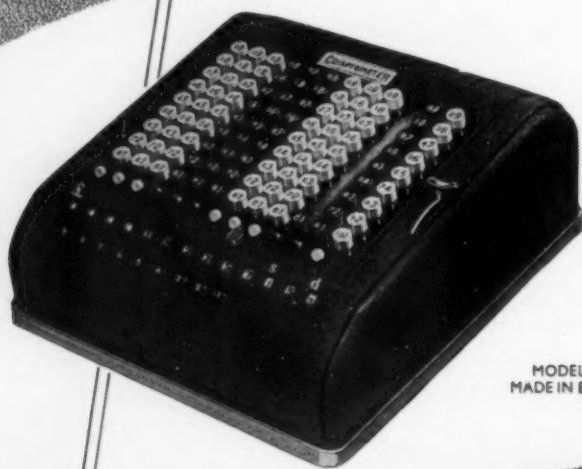
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BRITAIN'S
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A **FREE** trial
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for yourself!

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COMPTOMETER

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Schools in every
big town

BUSINESS about the promotion of the sales of Beefeater gin in this country. I hope your article will be widely read because it illustrates very graphically the success of an imaginative approach to marketing in the U.S.A.

I. P. GARRAN,

Minister (Commercial)

British Embassy,
Washington

★ ★ ★

Sir,

In his letter, reproduced in 'Talking Points' last month, Mr. James Boyd raises a point of particular interest to me, since I have been voicing similar sentiments for some while.

Each of the replies which you published comes from a company whose point of view, *prima facie*, appears to be well justified—namely, that the system or machine offered is so variable that discussion between the interested parties is preferable to a badly stated (and probably misleading) price.

On the other hand, advertisements by nationally-known companies frequently appear for one particular machine, one particular system or one particular piece of office equipment, without the benefit of an indication of price. Like Mr. Boyd, I must ask, "Why?"

Surely it would be preferable to state a basic price for a piece of equipment, even if 'optional' or 'essential' accessories are quoted as 'extra.' From this, the prospective buyer would at least be able to deduce the approximate extent of the outlay entailed. In cases where an item requires no accessories or is subject to no variation, there can be no excuse or good reason for not quoting a price.

As far as I am concerned, advertising without price is less than valueless, for my 'consumer resistance' is immediately stiffened by the prospect of yet another representative calling in response to my request for further details. If I require further explanation and the services of a specialist, I will ask for them.

Generally, however, as a result of

FEBRUARY, 1957

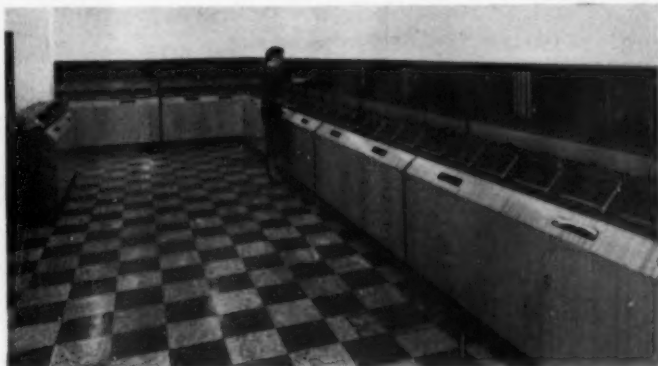
PEOPLE PRODUCTS PLACES I

LONG SERVICE—It was in 1916 that Charles Owens joined Joseph Gillott and Sons Ltd., the Birmingham pen firm, as an office boy. Now he is appointed a director of the company. "Times have changed," he comments. "In 1916 the use of a typewriter by a pen firm was unthinkable . . . all correspondence was written by hand."



KINDLY LIGHT LEADS—

Big-store shopping is brought up to date with this push-button pathfinder—installed at Bourne and Hollingsworth, London. Shoppers press the button corresponding to the item they are after, and a 'You-are-here' panel, plus the best route to the required counter, light up on a layout map. Incidentally, the display also lights up an advertising panel for the product in question.



REMOTE CONTROL—Between 500 and 600 executives at the new London headquarters of Babcock and Wilcox Ltd. use this centralized dictating exchange, claimed to be the largest in the world. It consists of 72 machines receiving dictation from 272 points in the building. Some 45 typists deal with the transcriptions.

the excellent advertising material provided, I can decide whether A's type-writer is more suitable than B's, or C's office stool is better than D's. All I want to know is whether I can afford it.

DAVID J. MILES,
Secretary
Campions (Bakers) Ltd.,
Portsmouth

★ ★ ★

Sir,

In his article on plastic tooling (*BUSINESS*, January 1957) your contributor, Mr. John Ash, concludes with the observation: "Where this country apparently falls down is in the lack of formulating companies. Abundant in the U.S.A., these companies act as a third party between resin manufacturers and resin users, either by making tools or by supplying the necessary resins, hardeners and fillers in ready-to-mix form."

The objection to the view implied in this statement is a simple one: it is that the leading resin manufacturers in this country already give resin users just such a service as your contributor describes. "Third party formulating companies" would offer no appreciable advantages to the resin users and would be largely dependent upon manufacturers for advice upon formulations, etc.

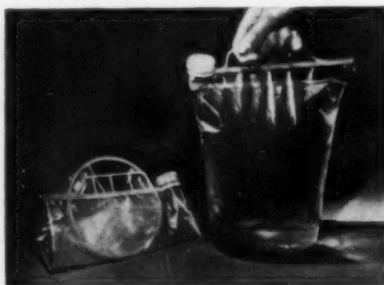
Your contributor kindly referred to Aero Research Ltd. as a company actively engaged in the development of epoxide resins. We were, in fact, the first manufacturers of epoxies in Great Britain and have for a considerable time offered a complete service to users of epoxy tools. This service includes supplying both basic resins and the formulations required for specific needs, and we naturally accept the responsibility of suggesting several contracting organizations most suitably equipped for undertaking the manufacture of the tools.

We hope you will allow us space to offer this divergent view, which in no way detracts from the merit of the article.

K. S. MEAKIN,
Publicity Manager
Aero Research Ltd.,
Duxford, Cambridge

PEOPLE PRODUCTS PLACES 2

HONOURED—The award of a New Year's knighthood to Noel F. Hall is an encouraging indication of the present status of management education in Britain. Mr. Hall has been principal of the Administrative Staff College, Henley, since its inception in 1946, and has played a major part in building up that remarkable institution.



COLLAPSIBLE BOT-TLES—Thin-walled containers can now be made of polythene. British rights for the process which makes this possible have been acquired by Spesco Developments Ltd. The company claim advantages of weight, price and storage space for their product.



FAIR REWARD—D. A. Lyons of Trix Electrical Co. reaches for the two gold medals his firm won at San Francisco's 1956 State Fair, while Sir William Rootes—chairman of the Dollar Exports Council—beams his approval. Trix were the only British exhibitors to win two such medals.

WHEN YOU'RE COMPLETELY 'HELD UP'



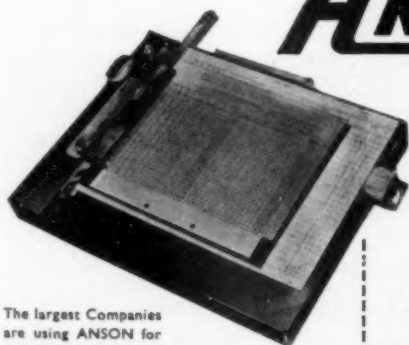
. . . . When the wages office is inundated with work. A key worker has just left and you've no replacement. Overtime is astronomical. **YOU'RE COMPLETELY HELD UP.** Then the immediate answer to all your problems is an Anson Payroll Machine.

The Anson Payroll Machine saves hours of work because it cuts form-filling to a minimum, and it reduces the cost of P.A.Y.E. wage payment by half. It is simplicity itself. The wages clerk merely loads the magazine with the payroll documents and makes his entry on the Anson Tax Card (the top record) and the Pay Slip, Wages Sheet and Wage Envelope are automatically filled in too. Four jobs done at once. There's no risk of transcription errors. No perforated payslips to tear off. In fact, it's so quick, about 50 complete entries can be made in an hour.

The Anson Payroll Machine is noiseless, cannot go wrong and is extremely economical to buy and to operate. It is approved by the Inland Revenue Authorities and is available to any company employing over 25 people. It will reduce the pressure of work in your Accounts Department. Further details will be gladly sent on receiving this coupon.

ANSON PAYROLL MACHINE

SAVES LABOUR, TIME AND MONEY



The largest Companies
are using ANSON for
paying Confidential Salaries

1957

GEORGE ANSON & CO. LTD.

Anson House, 58 Southwark Bridge Road, London, S.E.1

Telephone: Waterloo 3746/9

Please send full details of the Anson Payroll Machine to:

NAME

COMPANY

ADDRESS

No. employed

*There's an
ABBESS
desk and chair
for everyone
in your office*



Model 6756L



Model 6755L

Really effective office planning, for comfort, appearance and efficiency can be achieved by selection from the Abbess range. Complete freedom of choice may be exercised in devising a layout suiting your individual need, as basic principles of design are standard throughout Abbess production. Sound construction and quality is ensured as more than 80 years manufacturing experience lies behind the Abbess name.

The models illustrated represent a small selection from a wide range of equipment. A fully illustrated catalogue will gladly be sent on request.



Model 6702



Model 6708



ABBOTT BROS.
SOUTHALL

**ABBESS WORKS, SOUTHALL,
MIDDLESEX**

Telephone: **SOUthall 1357**

Telegrams and Cables: **Abbess, Southall**

TALKING POINTS

DIRECTORS UNDER BOMBARDMENT

A New Hazard in Business Administration?

SERIOUS-MINDED chairmen occasionally grumble about the small number of shareholders who display an active interest in their company's affairs. This sort of criticism will probably be modified as a result of the Perkins Incident.

Mr. Perkins is the shareholder of Sidney Flavel and Co., Leamington Spa, who expressed a measure of disagreement with the directors' policy by throwing eggs and tomatoes during the annual general meeting. It is reported that his barrage narrowly missed the chairman, Mr. Trevor Westbrook.

The ensuing events were dramatic. According to a Birmingham newspaper, 'other shareholders converged on Mr. Perkins and he disappeared beneath a pile of bodies.' One shareholder 'had a finger dislocated in the struggle.' This would appear to say a good deal for the esteem in which the board are held generally.

As Mr. Perkins was being escorted from the room he announced that he would 'see them again next year.' Apparently he had demonstrated in the same way, and with no greater accuracy, at the 1954 meeting.

Later he told a reporter that he was protesting, on principle, 'against mismanagement.' We are not sure that this is fair criticism from an egg-thrower who has missed a board of directors, at close range, on two successive occasions.

Boards who feel uneasily that the incident will set an unfortunate precedent might consider the possibility of engineering, by stealth, a mix-up of the sort which occurred in Manchester recently. In this case a former chairman and managing director of a firm, accompanied by

several reporters, awaited the opening of the annual meeting in one room, only to be told, after more than 30 minutes, that it had already been held in another part of the building.

BUSINESS, however, is concerned impartially with the interests of all parties. For this reason we are compelled also to draw attention to Mr. Perkins' tip that eggs can be carried to an annual meeting in the coat pocket, without personal danger, by placing them in a bag of confetti.



PENSION BOOKLETS

Why are they so dull?

WHETHER or not an employer regards pensions as deferred wages (see page 69) he should at least make sure that the employees know *how much* the firm are doing for them in this way.

For a pension scheme inevitably costs a lot of money. Even where the benefits which it provides are fairly modest—say, a pound or two a week for men with 40 years' service—the firm generally have to spend a sum equal to about 5 per cent of the wage bill. In some of the more ambitious schemes this figure is as high as 20 per cent.

Yet few firms seem to present their pension arrangements in an imaginative way. Any banging of drums is restricted to a short period when the scheme is introduced.

So often the new employee is simply given a small, uninspiring booklet which describes the scheme's benefits in stodgy (and sometimes baffling) language. Admittedly he can get further details from the per-

sonnel officer or another executive—but telling people that they can ask for information is not half as effective as telling them the facts in the first place.

Pension booklets generally follow the pattern made familiar by the big assurance companies. Seldom is a firm's publicity department given the job of producing something which both looks and reads well.

Is there any reason why a booklet should not open by telling the 'average' employee what he can expect if he stays with the firm? For example: "You will get a pension of about £2 a week for life if you retire after 40 years, and your wife will get a tax-free lump sum of £800 if you die before then. The company will pay the whole cost of these benefits."

This direct statement would then be followed by the inevitable qualifications. It would be made clear that the booklet was intended as a guide, and that a set of rules was available on request.

Many executives overlook the importance of presenting any sort of financial or statistical information in the simplest manner possible. Even the use of percentages perplexes some workers—whereas the corresponding fractions would be quite clear.



25,000 SALESMEN ?

Ford's New Campaign

ONE of industry's big problems in 'employee relations' is to get the man who tightens nuts on a mass-production line to identify himself with the end-product.

The present crisis in the car industry has inspired the Ford Motor Company to take this idea a stage further. They believe that their 25,000 - odd employees, including those who are now on short time, should play an active part in *selling* the company's products.

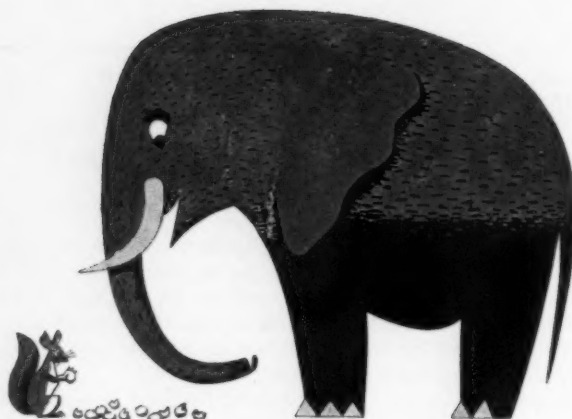
Supervisors are distributing special forms to those who think they can help. The employees are asked to use these to send the names of prospective buyers to the company's home sales division, who will then pass the information to Ford dealers.

Is your business

large?

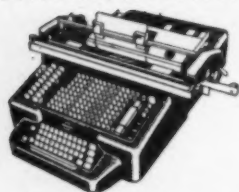
...or

small?



Small businesses—no less than large ones—derive great savings from the use of mechanical accounting methods; especially when the machines they

use are *exactly suited to the scale and scope of the work they do*. With the world's widest range of "comprehensive" and "specialist" models to choose from (over 70 standard models alone) it is not surprising that National users are always "perfectly satisfied", "delighted with the results" and "wholly convinced" of their "wisdom in making the change".



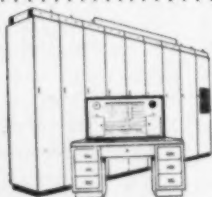
All-Purpose ACCOUNTING MACHINES



'Small Office' BOOKKEEPING MACHINES



DIRECT-ENTRY
Accounting and
Adding Machines
over Seventy
standard models alone



*Demonstrations
by arrangement*

ACCOUNTING BY ELECTRONICS

By using National Accounting Machines as the means of originating data (in the form of punched tape) for input into the National-Elliott 405 DATA PROCESSING COMPUTER, conventional records printed in normal characters are produced, simultaneously, at the "point of original entry". Thus, on-the-spot action at branches, depots, sub-offices and separated departments can be progressed on the basis of immediately accessible information provided by their own, self-proved records.

THE NATIONAL CASH REGISTER COMPANY LTD., 206-216 Marylebone Road, London, N.W.1. PAD 7070



Key Points in

Planning a WORKS Pension Scheme

Deferred wages? Incentives? Social obligation?

The way in which a firm regard pensions for manual workers will have a big influence on the type of scheme which they adopt. But other important issues have to be considered as well.

Photograph by
Adolf Morath, London.

IN the past few years the businessman's attitude towards the retirement of manual workers has changed considerably. The gold-watch-and-handshake policy (supplemented, perhaps, by *ex gratia* payments from a benevolent fund) is on the point of becoming an anachronism. More and more firms are accepting the idea that even unskilled factory workers are entitled to the protection of a proper pension scheme.

Already this trend has reached a fairly advanced stage. In a recent survey, the Industrial Welfare Society approached 280 firms of different types and sizes and found that no

fewer than 142 of them had pension schemes for hourly-paid manual workers.

The sample was drawn from the Society's members (by implication, a class among which one would

By PETER SPOONER

expect to find plenty of schemes) and for this reason the results may give a somewhat biased impression of the position generally. Nevertheless, in 1954, a government committee estimated that about six million em-

ployees, out of a working population of roughly 23 million, were covered by non-statutory pensions funds and schemes—three times as many as before the war. It also estimated that the number of funds and schemes was in the region of 27,000. Undoubtedly these figures have risen appreciably since then.

But the position is still full of anomalies. In some industries—oil refining for example—where labour costs represent a relatively small percentage of total production costs, works schemes have been widely established for 20 years or more. In others, big and famous firms have

only just got to the point of introducing them.

A man may spend his working life in one factory and get nothing more substantial than a long-service certificate. From a second firm he might have got a small 'nest egg' or a weekly pension of, say, 20s. From a third he might have retired comfortably on a pension which, with his state pension, would have equalled more than half of his past earnings. All for doing the same job in the same way at the same pay!

It is by no means essential to set up a separate scheme for manual workers: in fact, many firms have adopted schemes which are open to all employees—from factory or office—on equal terms. Where there are separate arrangements, the manual worker's pensions are invariably smaller than those paid to the clerical staff.

This reflects, to some extent, the traditional idea that office workers are on management's side and factory workers on 'the other side.' Today, however, many of the arguments in favour of separate schemes seem less convincing than they did in the 'thirties.

Is a filing clerk necessarily worth a better pension 'investment' than a skilled machine-operator? Is the machine-operator less likely to appreciate the company's efforts to ensure that he has a reasonably comfortable retirement? Of course, it would be difficult to answer these questions without reservations. But clearly it is important that 1957 schemes should be based on 1957 thinking. Or, even better, on 1967 thinking. Changes in a scheme are costly and unsettling to the employees; the aim should be to get things right at the beginning.

Different people regard industrial pensions in different ways. Some think of them as deferred wages. Others consider that firms who provide them are simply fulfilling a social obligation. A third group take the wholly practical view that a scheme helps to attract workers, reduce labour turnover and improve morale.

The management of a firm who are setting up a scheme for the first time,

or are bringing up-to-date an established scheme, should decide quite clearly how they regard pensions. This is not an airy-fairy issue; their decision will help to determine the form in which the scheme is eventually launched.

For example, if pensions are regarded as deferred wages, adequate provisions will have to be made for employees who leave the firm before they reach retirement age. Merely to return the money which they have paid into the scheme (assuming that it is contributory) hardly conforms with a policy of this sort. If the 'social obligation' is placed first, special consideration will have to be given to the fact that an employee's wife will probably outlive him by several years.

No one has successfully measured the incentive value of a pension scheme (although in a recent Gallup poll which listed a number of amenities and asked "Which do you think is most important?" 28 per cent put pension schemes first). It must be remembered that to a man in his twenties a pension at 65 seems extremely remote. But if he has family commitments, the scale on which the scheme provides death benefits may cut a lot of ice.

It should also be remembered that the incentive value of a pension scheme is capable of backfiring. An employee who feels that he is tied to his firm by accumulated and non-transferable pension rights may become frustrated: then his work may suffer and he may have an unsettling influence on others.

Trust or Assurance?

A firm may decide to set up a private trust and run the whole scheme themselves. Alternatively, they may place it in the hands of outside experts—either direct with an assurance company or through a firm specializing in the administration of industrial pension schemes.

The private-fund-versus-life-office controversy has been going on for some time and many of the arguments have become dog-eared. Probably it is enough to say that a trust fund is more flexible but involves

New Trends in Works Schemes

The number of works pension schemes has increased tremendously during the past few years—and their character has changed also. This analysis, based on the results of a recent survey* by the Industrial Welfare Society, gives firms an opportunity to compare their own schemes with the latest trends. It will also help those who are considering a scheme for the first time.

In making their survey the I.W.S. obtained information from 248 firms with more than 250 employees each. Of these firms, 142 have schemes which embrace manual workers.

* "Industrial Pension Schemes", Industrial Welfare Society Inc. 8s. 6d.

more administrative work and more responsibility. Many firms find that 'off the peg' life office schemes satisfy their requirements in most respects.

In some ways, pension consultants provide the best of both worlds. Their schemes are based on life assurance (usually guaranteed endowment policies) but are 'tailored' to suit individual firms.

Whether or not a firm decide to set up a private fund will depend, to some extent, on the resources of the business and on the availability of people with the time and qualifications to act as trustees and assume responsibility for the fund's investments. Certainly private funds are not the prerogative of large organizations. Even among firms with fewer than 500 employees they are quite common: the I.W.S. survey suggests that the ratio is about one in five.

Often the pensions are paid straight from the fund. In a big organization the law of averages enables the trustees to estimate these commitments with some accuracy. But in a small firm there is always a danger that a number of the men who retire at 65 will live longer than the 11 or 12

Among the big firms (over 1,000 employees) the proportion with works schemes is two-thirds. Among the small firms (up to 500 employees) it is two-fifths.

★

The number with separate schemes for works employees and staff is roughly the same as the number with 'combined' schemes. But separate schemes are twice as common in big firms as they are in small firms.

★

Life office schemes provide the biggest group: 40 per cent. Then come 'self administered' schemes (21 per cent), unfunded schemes (15 per cent) and 're-insurance' schemes (9 per cent).

★

Among contributory schemes, the most 'popular' form of contribution is a progressive percentage of salary (i.e. the percentage increases as the salary increases). But flat weekly payments are also common: nearly one-third of the schemes employ this system.

★

As a rule, benefits are based either on an 'average salary' system or on

flat amounts (nearly always related to years of service). 'Final salary' systems are rare among works schemes.

★

The payment of pensions is usually guaranteed for a period of five years after retirement even if the pensioner dies.

★

Generally an employee has the option of taking a smaller pension which will go on as long as either he or his wife is alive. In some schemes, the option is extended to other dependants.

★

When an employee leaves the firm of his own accord, most contributory schemes allow him to withdraw his own contributions (sometimes with interest). Half give him the option of continuing his payments into the scheme, some firms reserving the right to continue their payments as well. Also common is the option to 'block' his payments and thus receive a pension at retirement age: nearly 40 per cent of the schemes provide this automatically, and another 30 per cent do so at the company's discretion.

When an employee leaves 'involuntarily' (on account of redundancy, ill health, domestic reasons, etc.) all the voluntary schemes allow him to withdraw his contributions. About two-thirds give him the option of continuing his payments (in most cases the company's contributions continue as well) and all but a few schemes provide a 'blocked' pension option (generally based on both the employee's and the company's contributions).

★

When an employee is discharged for unsatisfactory work or conduct, the withdrawal of contributions is allowed by about three-quarters of the contributory schemes; the option to continue payments by about one half; and the 'blocked' pension option by just over two-thirds. But it is very rare indeed for the employee to gain any benefit from the company's contributions on his behalf.

★

Death benefits vary considerably. The most common types are (1) one year's pay; (2) refund of contributions plus a lump sum, usually in the region of £100-200; and (3) widow's pension.

years which is normally expected. Therefore, a fairly common safeguard is to use the fund to purchase immediate annuities for individual employees when they reach the retirement age.

Tax Concessions

One of the most important things which a company has to consider when choosing the type of scheme is tax relief. Here, unfortunately, the position is rather unsettled.

To secure tax relief, a private industrial pension scheme has to be approved by the Inland Revenue. If it is not approved, the contributions paid by the firm in respect of each employee are added to the employee's wages and taxed accordingly.

The legislation on this subject is long-winded and anomalous. Indeed, the Millard Tucker Committee studied the position for nearly four years before issuing a report which proposed some far-reaching changes and some compromises. A number of their recommendations were incorporated, with modifications, in the 1956 Finance Act.

At present the position, broadly, is that pension schemes can be ap-

proved under either Section 379 or Section 388 of the Income Tax Act of 1952. The tax concessions which these sections provide differ considerably—although in both cases the contributions paid by the employer are treated as a business expense.

In the first case the employee's contributions (if any) are not taxed at all. In the second, the relief is two-fifths of the premiums. (Of course, the benefits differ as well. For example, Section 379 schemes cannot make lump sum payments, apart from returning an employee's contributions with interest if he leaves the firm or dies before reaching retirement age, in which case the fund has to pay tax on them at a reduced rate.)

For the employer a more important issue arises. The main advantage of Section 379 approval is that it exempts from taxation the investment interest earned by the fund. Under Section 388 there is no tax-free build-up: the investment income of the scheme is taxed at the rate applicable to the insurance company which underwrites it.

But the position has been confused by a section of the 1956 Finance Act

which extends the tax exemption on interest to so-called re-insurance schemes approved under Section 379. These schemes are, in effect, trusts whose funds are invested in insurance policies, mostly deferred annuities. They are organized by life assurance companies.

Endowment assurance schemes were excluded from this new concession, apparently on the grounds that it would be wrong to exempt from tax the interest on investments eventually to be distributed tax-free in the form of death benefits or lump sum retirement benefits. Its 'discriminatory' effect was immediately criticized by assurance companies, who claimed that the concession should be extended at least to the annuity side of Section 388 schemes. Otherwise, they feared that a large number of firms would be tempted to change from Section 388 schemes to Section 379 schemes—thus involving the Revenue, and the insurance profession, in chaos.

Under pressure, the Financial Secretary to the Treasury made a somewhat unsatisfactory statement to the effect that people who were considering changes of this sort should think



Many firms have found that a satisfactory arrangement is to combine a non-contributory scheme with an auxiliary scheme under which employees can voluntarily increase their pensions by making regular payments.

twice because "the law relative to these pension schemes is not necessarily going to remain as it is indefinitely." That is how the matter stands at the present.

Whether there has been a marked swing towards Section 379 schemes is not yet clear. Certainly some firms have made the change—but there have also been changes in the opposite direction. Actuaries are inclined to recommend firms to adopt Section 379 schemes on the principle that "there is nothing to be lost anyway." On the other hand, the Financial Secretary's statement included a warning that firms who are too hasty in switching may find that "in fact they have made a mistake against their own interests."

Who Foots the Bill ?

Another important and controversial question is whether the full cost of a pension scheme should be borne by the employer.

Before the war, schemes for manual workers were nearly always non-contributory. Now there are signs that the pendulum is swinging the other way.

This trend is not in accordance with the advice offered by some pension experts. On the other hand, many of the original objections to contributory works schemes are now out-of-date.

Changes in the status—and the earnings—of manual workers have taken the edge off the argument that they are not in a position to save for their old age; or that they gain less from tax concessions than black-coated workers. In fact, the Office Management Association's 1956 survey of clerical wages indicated that the average weekly earnings of a manual worker are several shillings higher than those of an adult male clerk.

Nevertheless, there is a strong case against the contributory principle. Here are the main arguments:

- 1—A contributory scheme (if voluntary) seldom obtains a 100 per cent membership. The expense of taking part in it may well discourage the people whose commitments make adequate cover most necessary.
- 2—Employees are more appreciative of a non-contributory scheme.
- 3—To offset their contributions, the employees might seek—and eventually get—increased wages. If so, the employer would be forced into a position where, indirectly, he would have to pay the lot anyway, without gaining the advantages of a non-contributory scheme.
- 4—If a scheme is non-contributory, the employer retains full control of it. Alterations can be made as and when they are needed, without consulting the employees.
- 5—The administrative trouble and expense of making small deductions from the employee's wages are avoided.

To these points may be added the danger that some employees regard a contributory scheme as a sort of Christmas club, and leave the firm simply because they want to get back their contributions in a lump sum.

Probably the most down-to-earth argument *against* non-contributory schemes is that—unless the employer digs very deeply into his pocket—the benefits it produces are relatively small. To give every long-service employee a pension of 25s. a week, a firm may have to spend a sum equal to about 5 per cent of the payroll; more if there is a large number of elderly employees when the scheme is introduced and full account is taken of 'back service.'

Many firms have found that a satisfactory compromise is to set up

an auxiliary scheme under which employees can voluntarily increase their pensions by making regular contributions. What this involves is described later.

Types of Assurance

It has already been indicated that pensions (other than those in the form of direct payments from a private fund) are generally based on one of two types of assurance. These are:

Deferred Annuity Policies. Usually there is a 'master' policy which covers either all employees or a specified group of employees. Premiums may be paid wholly by the firm, or the employees may contribute on an agreed scale, the firm making good the balance. On reaching the retirement age prescribed by the scheme, an employee receives a pension for life.

Endowment Assurance Policies. In this case the retirement benefit emerges as a tax-free capital sum, with which the organizers of the scheme buy an immediate annuity for the employee concerned. Alternatively, the employee may be given the option of taking one-quarter of the benefit as a lump sum, a smaller pension being bought with the remainder.

Schemes organized by pension consultants are generally based on endowment assurance. A big advantage, the consultants point out, is that they are able to purchase—from any insurance company and at the most favourable rates available at the time—an annuity which best suits the employee's circumstances when he retires.

Usually they recommend 'non-profit' schemes. Their objection to 'with-profits' schemes is that the policy-holder is in fact carrying part of the risk because future rates of bonus cannot be guaranteed.

Fair Shares

The 'funding' of a scheme is an important consideration: so is the way in which individual benefits are calculated.

During the past few years there seems to have been a steady increase in the number of 'nest egg' schemes,

under which a retiring employee is simply paid a lump sum, often in the region of £10 for each year of service. An argument in their favour is that a payment of, say, £400 may seem much more attractive to an employee than the relatively small annuity which it would buy. The main arguments against them are that they place a capital sum in the hands of people who are not necessarily equipped to use it wisely; and that they go only a little way towards providing the security which is the prime object of pension schemes.

A method commonly used in works schemes is to provide annuities on the basis of a flat amount for each year of 'eligible' service. This produces fewer anomalies than it does in staff schemes, because the earnings of most factory workers remain at much the same level (leaving aside the effects of inflation) throughout their working lives. Moreover, it has the merit of simplicity, and is easily explained to employees. In contributory schemes, it is often linked with a system of contributions based on flat weekly payments.

Another common method (widely used in schemes organized by life assurance companies) is to base each employee's pension on a percentage of his earnings during his period of eligible service. Schemes of this sort generally seem to favour the 'progressive percentage' principle—in other words there is a different percentage for each of a number of salary grades. Similarly, the employee's own contributions may be based on a percentage which rises with his wages.

Some pension experts take the view that 'average salary' principle is not appropriate to works schemes (although obviously there is more in its favour when the scheme is open on equal terms to both factory and office workers). They suggest, however, that the incentive value of a simple flat-sum-per-year system can be increased effectively by relating the benefits scale to employment category as well as to length of service.

A typical scale, drawn up by the

Noble Lowndes Pension Service, is shown at the foot of this page.

If an employee is up-graded at any time, he automatically qualifies for benefits at the scale appropriate to his new category. Noble Lowndes recommend that the employer should bear the whole cost of the premiums, which (in the example shown below) would probably be between 4 and 5 per cent of the wages bill.

An arrangement of this sort overcomes the administrative difficulties of basing pension benefits on a percentage of the earnings of employees who qualify for piecework rates, incentive bonuses, cost-of-living allowances, overtime and other odd amounts. It does not allow for the effects of inflation (average salary schemes do so only in a half-hearted way) but there is the practical advantage that the firm's pension commitments do not rise automatically whenever a wage increase is granted. Of course, the firm can amend the scale of benefits from time to time.

Voluntary Payments

The practicability of running an auxiliary pay-if-you-wish scheme in parallel with a main non-contributory scheme was mentioned earlier. This set-up overcomes the objection that a non-contributory scheme on its own misses the advantages (intangible though some of them be) of active participation by employees.

Typical in many respects is the works scheme which was introduced last year by Stewarts and Lloyds Ltd. and their associated companies in the U.K. The basic pension (the whole cost of which is borne by the company) is 9d. a week for each year of

service up to a maximum of 21. In addition, employees between the ages of 21 and 55 have the option of increasing their pensions by contributing 2s., 4s., 6s. or 8s. a week until they reach the normal retirement age of 65. If a man of 21 regularly contributes 2s. a week for 40 years, he will receive 19s. 11d. a week on top of his basic pension.

A convenient method is to base voluntary schemes on endowment assurance. This secures benefits on much more favourable terms than the employees could obtain as individuals; generally the saving is between 20 and 30 per cent.

A separate endowment assurance policy is issued to each employee who decides to join the scheme. Premiums are paid in advance by the employer, who collects them from the employees concerned in the form of weekly wage deductions.

When an employee retires he has the option of receiving a tax-free sum. Alternatively, he may ask the assurance company to convert either the whole or part of this sum into a pension, at not less than the guaranteed rate shown in the table of benefits.

If he leaves his employer before reaching the age of retirement he can do one of three things: (1) keep his policy in force by making yearly, half-yearly or quarterly payments direct to the assurance company; (2) take a paid-up policy for proportionately reduced benefits, provided that at least one year's premiums have been paid; or (3) discontinue the policy and take the cash surrender value.

Continued on page 134

Category	Pension per annum for each year of service	Immediate life cover for employee with 40 years past and future pensionable service
Chargehands	£2 12s.	£1,040
Skilled operators	£2	£800
Semi-skilled operators	£1 10s.	£600
Unskilled operators	£1	£400
Females	14s.	Return of premiums

Specimen scale of 'graded' benefits (see this page)

Combining 'Good Looks' With Greater Efficiency

By ALAN PETERS

The appearance design policy of Metropolitan-Vickers Electrical Co. has not only improved the looks of many products—it has also accelerated the development of better products which can be made more simply.

Methods include the employment of an outside consultant and the setting up of an appearance design department

THERE are some products which a customer buys simply because he likes the look of them. Whether or not they are as good as they look will obviously affect sales in the long run, but for much of the way appearance is the thing which counts.

At the other end of the scale is a variety of products—like those of the heavy engineering industries—which stand or fall by the efficiency with which they work. In their case the designers, even more than the customers, may be inclined to think that 'looks' are a pretty small consideration.

Most of the products of the Metropolitan-Vickers Electrical Co. Ltd. fall into the performance-first category: seldom does a customer expect

to be stirred aesthetically by the sight of a transformer or a piece of switch-gear. Yet for some years this company (alongside other members of the Associated Electrical Industries group) have been developing new standards of appearance design in all departments of their business.

The aim is to conform as far as possible with a statement in which the group chairman, Lord Chandos, pointed out—echoing the well-known dictum on justice—that "engineering products should not only be efficient; they should manifestly look efficient."

Metropolitan-Vickers' efforts in this field actually stem from a directive which was sent to all members of the A.E.I. group in January 1949. Its purpose, and its effect, was to lift the question of 'looks' into



New look for indicating dials. In the latest design, pointer and scale are bolder, distracting features are eliminated

the realm of top-level design policy.

The company had been examining, on their own initiative, the possibility of improving and standardizing the appearance of many of their products. The A.E.I. directive was an action-signal. But Metro-Vick recognized the danger that over-enthusiastic action might do more harm than good. In their opinion it was useless to think of superimposing some form of 'cleaning up' operation on the routine work of the company's large teams of engineering designers and draughtsmen.

As a rule, the products of electrical engineering evolve slowly; even after

they are made it may be several years before their efficiency is proved conclusively under operational conditions. Clearly the engineering, production and sales personnel would resent any sort of 'police action' by a group of arty-crafty designers. To achieve long-term results, an appreciation of appearance design had to be developed *inside* the existing organization.

Metropolitan-Vickers approached these problems in four ways: (1) By setting up an appearance design committee on which senior engineers and salesmen are represented; (2) by employing an outside consultant on a permanent basis; (3) by setting up an appearance design office—unique in the A.E.I. group; and (4) by developing propaganda and educational schemes.

One reason for the success which this four-part programme has already achieved is that the exponents of appearance design have managed to establish the fact that they are not concerned *only* with making products look more efficient. In some cases, their recommendations have led to the development of products which are actually more efficient in use—and can also be made more efficiently.

Overall Guidance. The appearance design committee has the task of seeing that the *intentions* of the 1949 directive are carried out satisfac-

torily. It is not responsible for originating design features; and it does not act as an overriding approving body.

There are seven members, all co-opted informally. They include four chief engineers, chosen on the basis that one man may represent the interests of two or more departments whose products are of broadly similar types, and a sales manager, who represents his opposite numbers in all departments. The committee has a 'neutral' chairman (at present, the company's deputy chief electrical engineer) and its secretary is the head of the appearance design office. The outside consultant generally attends its meetings, which are held every three months or so.

One of its members is also a member of the group appearance design sub-committee, which operates under the wing of the main A.E.I. engineering committee. This set-up ensures that there is some degree of co-ordination between the policies adopted by individual companies.

Outside Help. The 1949 directive stated that in certain cases—mainly concerning the production of light engineering equipment, medical equipment and domestic appliances—the assistance of a consultant approved by the A.E.I. appearance design sub-committee should be obtained at the 'earliest reasonable stage' in the de-

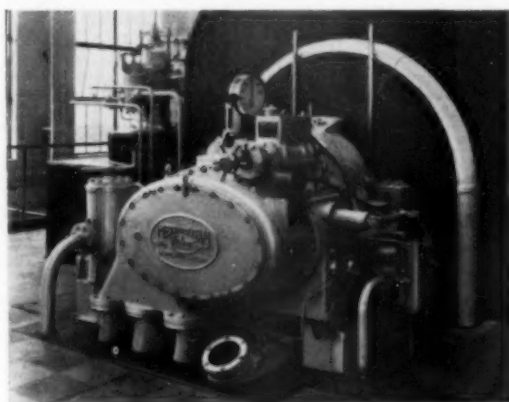
velopment of new designs. Although switchgear, generators and other heavy equipment were excluded from the terms of the directive, Metropolitan-Vickers have followed the spirit of this recommendation in these fields as well.

Their 'permanent' consultant was chosen with the help of the Council of Industrial Design. After his appointment, he gained experience of the company's specialized type of engineering by visiting the workshops of all departments.

Primarily his job is to advise the chief engineers and their staffs, and only rarely is he expected to produce designs on his own account. Every month he spends two consecutive days at the company's Trafford Park works, visiting the departments in which his services are particularly needed. His programme on each occasion is planned by the appearance design office.

The aim (which has to be modified in some cases) is that he should consider the appearance of a new product while it is still at an early stage of development, make recommendations from time to time as the work progresses, and finally check the results before tooling-up places a dead hand on the possibility of making improvements. The dangers of trying to add 'good looks' as an afterthought are now widely recognized.

Metropolitan-Vickers are convin-



End pedestal of a steam turbine before and after re-design. Accessibility has not been sacrificed to appearance: the cover is easily removed when controls have to be adjusted

One advantage of employing an outside consultant is that the company's own design staff are put on their mettle. Generally there is a desire to show him what they can do—and that, after all, is the whole object of the programme

ced that the employment of a consultant in this way has done a lot to improve the appearance of many of their products. One advantage is that the company's own design staff are put on their mettle by the knowledge that their work is being scrutinized by an outside expert. Generally speaking, there is a desire to show him what *they* can do—and that, after all, is the main object of the programme.

Practical Work. The appearance design office, a small unit employing only three people, has produced some remarkably good results. Although it is nominally a section of the electrical engineering department, its 'roving commission' covers most aspects of the company's design work.

Its chief, the appearance design engineer, was formerly employed on display work in the company's publicity department. In the course of this work he has acquired an extensive knowledge of Metro-Vick products (especially of their appearance!) but even more important, he is a fully qualified engineer with a life-long interest in most aspects of design.

Another member of the team was recruited from the Council of Industrial Design. He joined the appearance design office after taking one of the company's two-year 'college apprenticeship' courses. His work is mainly 'in the field,' and as a matter of policy he is being attached in turn to different departments.

The third member spends much of his time preparing 'renderings' of proposed designs, including three-dimensional models; he also assists in designing handles, hinges and other widely-used fittings which the A.D.O. puts forward from time to time in the hope that they will be

standardized by all departments.

The words 'put forward' and 'hope' are important. For the appearance design office is simply an advisory body: it has no executive powers. Whether or not its recommendations are followed depends almost entirely on the success with which they are 'sold' to departmental chiefs.

A big problem is the size and structure of the Metropolitan-Vickers organization, which employs more than 20,000 workers and is divided into about 20 departments. Each department is concerned with a specific group of products and is run, to a large extent, autonomously, by a three-man team: a chief engineer (who is initially responsible for designs), a production superintendent and a sales manager. And the responsibility for approving new designs is almost entirely theirs.

Another difficulty is that many of the company's products are made to specifications laid down by the customers or, in some cases, by independent bodies like the British Standards Institution. Under these conditions, improvements may be restricted: any changes often have to be agreed inside and *outside* the organization.

Experience has shown that persuasion gets remarkably good results. So good, in fact, that some departments have begun automatically to seek the advice of the A.D.O. when new products are being considered.

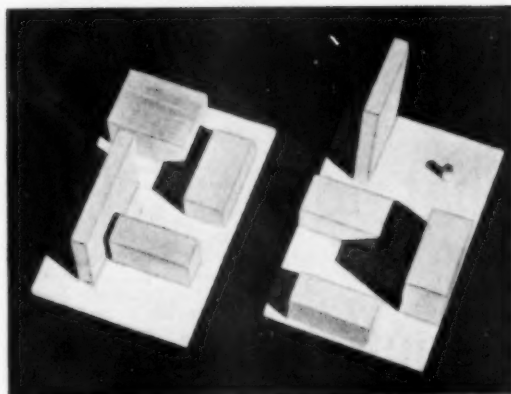
Generally, however, the A.D.O. is left with the responsibility of chasing jobs on its own initiative. To help it in this respect the appearance design engineer receives copies of the monthly lists of new developments which are prepared for the board of directors. He also sees a print of every photograph which is taken for publicity or other purposes.

The A.D.O. is particularly concerned with the problems of establishing a greater degree of uniformity in the appearance of the Metrovick products. Here, of course, the size of the company and its division into self-contained departments, raises many difficulties. But sometimes it is not simply a case of making different pieces of equipment look like the products of the same factory. It has even been necessary to iron out fundamental differences in design between opposite ends of the same product!

One of the achievements in which the A.D.O. has assisted is the development of standard cubicles for control gear, etc. In the past, cubicles were made, cheaply but rather inelegantly, by fastening steel plates to an angle-iron framework; different departments produced their own variations and sometimes, as a final dressing-up, the main joints were concealed with strips of metal beading.

Although pleasing in appearance, this railway signalling unit puts efficiency first. The control desk is designed—on ergonomic principles—so that the operator can either sit or stand





A special training programme is helping to make the company's design staff 'appearance conscious.' In 'experimental aesthetics' courses, models of the type shown on the left are used for exercises in 'special relationships.' On the right are full-scale models of pole-mounting transformers exhibited at the end of a projects course

To obtain flush surfaces, a method of construction was evolved which dispensed with a framework altogether and used folded steel sheets. Cubicles made in this way were very nice—but for many purposes were unnecessarily expensive. Moreover, a lot of additional work was thrown on to the company's press shops.

So now the company are standardizing a method of construction which scores on both counts. Frames are built from rounded and recessed steel sections designed especially for the purpose. These are supplied in standard lengths by an outside firm and are chopped up into whatever lengths are required for specific jobs. The recesses permit the flush mounting of panels, using either spot-welded clips (for panels which will not have to be removed subsequently) or neat countersunk screws.

The quest for uniformity sometimes involves major changes; but often big improvements are made simply by standardizing details. An example is the redesigning of instrument dials.

Here, indeed, is a case where appearance and functional efficiency are inseparable. The object has been to eliminate all markings which interfere with the purpose of the dial—which is to indicate clearly where a pointer is pointing! The 'before' and 'after' photographs which appear on page 74 show how successfully, and how agreeably, the aim has been achieved.

A side-effect (although by no means unimportant) is that redesigning the dials for appearance has actually simplified the manufacturing process. For the 'tramlines' used in the older type were inscribed in a separate operation after the segment divisions had been marked, and it was generally necessary for the operator to 'clean up' a number of points where registration was faulty.

Another detail which has been improved considerably is the design of nameplates and rating plates.

Ergonomic Studies

Some of the A.D.O.'s work involves the study of ergonomics—the new 'science' of designing equipment to suit the physical and physiological capabilities of the people who have to use it. Typical of its activities in this field is the development of a new control switch handle which will soon replace the 'pistol grip' switch generally associated with electrical control gear. In the old type, the handle and the pointer move in opposite directions, an arrangement which might momentarily confuse the operator in an emergency. The new type has a reversed handle, which eliminates this danger and also enables the operator to move the switch with a simple wrist-action, instead of having to twist his whole arm.

Ergonomic principles are also

being applied to the layout of control panels. Here, the aim is to break away whenever possible from the heavy-handed symmetry so often favoured in the past, and to arrange switches and dials in a form which is completely logical from the operational point of view.

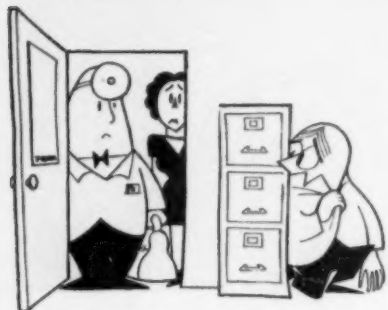
Education and Training. Although the appearance design staff are directly responsible for a number of developments of this sort, they have no wish to give the impression that they play the part of odd-job men, taking on specialized work which is really the responsibility of departmental designers. Their practical work is intended primarily as a means of spreading their influence as widely as possible, and thus encouraging other people to produce similar improvements.

For the same reason, they direct much of their attention at 'propaganda' and the development of training and educational activities. Periodically they issue bulletins on theoretical aspects of design like 'symmetry', 'lettering styles' and 'anthropometric data.' These are distributed to all engineers and draughtsmen. In addition, good and bad examples of appearance design are exhibited from time to time on display stands and notice-boards installed for this purpose in departmental drawing offices.

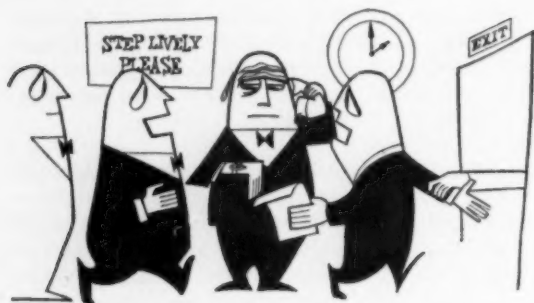
Although it appreciates the value

Continued on page 135

A Handy Health Guide for Executives



Stay away from doctors. Regular medical examinations are for sissies, not human dynamos. Only a snivelling hypochondriac would enter a doctor's office under his own power.



Keep a taut schedule. Your time is the company's time, so don't waste one precious minute. Why coddle yourself with an occasional breathing spell? You're not being paid to breathe!



Combine business with pleasure—particularly at social gatherings. It's true that the deal you arrive at in an hour of chatter over the Martinis could be consummated in ten minutes of direct negotiation—but it would not give you the same glow.

What to Do Till the Doctor Comes *

Once upon a time, people used to think that top-ranking businessmen paid for their success by exposure to a whole host of insidious 'executive ailments.' Today, however, some medical spoilsports allege that a president, given reasonable care, can last as long as a plumber or a piano-tuner. This, if true, does tend to rub some of the gilt off the managerial halo.

Nevertheless, martyrdom is still within the reach of any executive who is really determined to live dangerously. All that's needed is a bit of know-how.

Have everything clear through you. Whether it's a million-dollar order or the bi-weekly sump-pump performance report, better give it a quick once-over to make sure it's been done right—i.e. the way you would have done it.



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Never drop your guard. Keep up your dukes—and your adrenalin level—at all times. The boss asks you to lunch? He's planning to probe your inadequacies. A subordinate makes a suggestion? Watch him—he's gunning for your job!



Use your nights constructively. Why waste time sleeping when everyone knows the small hours are most favourable for flashes of creative insight? If your eyes persist in closing, mull over J.B.'s hint last week about possible cuts in your department.



Save your energies for the job. You're being paid to use your brain, not your muscles, so don't walk; travel by cab or company limousine whenever possible. Avoid all exercise like the plague, except when you must run to catch the train.



Smile if it kills you. What if the plant does break down while you're trying to make a contract deadline? What if the boss does turn down your carefully considered sales plan without a hearing? What if a subordinate's blunder does wreck that delicate, vital deal you'd been negotiating for months? Maintain a calm, imperturbable exterior at all costs. What's happening to your inside is nobody's business but the surgeon's.



Eat, drink, and be dynamic. You can doubtless close the deal over dinner (was it really lunch-time when you came in?) Anyway, the bigger the meal, the bigger the order. The company will be glad to pick up the check—and you've got plenty of insurance.



Put your vacation to use. It gives you a perfect opportunity to inspect all the plants in the Rocky Mountain Division. After you've reviewed the mid-season production plans, had a look at the new equipment and addressed a foreman's meeting, you can probably manage to fit in a round of golf with the plant manager.

Keep climbing. To reach the top, you should resolutely disregard any fatigues or injuries along the way. If you're controller, aim for treasurer; if treasurer, for president. If president, why not buy out the competition? An impressive obituary is worth all the effort.

Text by **LYDIA STRONG**
Drawings by **AL HORMEL**





ULTRASONICS

What They Can Do

EARLY in their industrial career ultrasonics were oversold. Unjustified claims were made (mostly by people unconnected with the manufacturers) for equipment barely beyond the laboratory stage. These units gave great promise but were often unsatisfactory for various reasons: they either overheated or produced ear-piercing whistles which fatigued operators. Consequently, although quiet and reliable devices have been available for some time they are viewed in some quarters with suspicion. Yet they can revolutionize many processes.

Ultrasonic techniques make use of acoustic waves pitched beyond the limit of human hearing. Their main industrial uses are:

Cleaning intricate or 'awkward' components which normally have to be scrubbed by hand.

Measuring the wall-thickness of large installations like tanks and boilers—or of pipes—where only one side is accessible.

Testing for flaws in castings, strip metal and hard plastics.

Soldering aluminium and other light metals, normally possible only by using corrosive fluxes.

Machining hard materials like ceramic, glass and tungsten carbide with

an ease and precision unobtainable by any other method.

There are many other applications: for example, the emulsification of dissimilar liquids in the manufacture of cosmetics and hair cream, the mixing of paint, and the precipitation of carbon black particles from fumes. Many of them require substantial capital investment in single-purpose installations, often assembled on site. The energy required for these pur-

- Machine hard materials
- Clean precision parts
- Make awkward measurements
- Speed up flaw-detection
- Simplify light-metal soldering

Transducers—small components with no moving parts—convert the electrical vibrations into acoustic vibrations which can be applied to the work in various ways.

Cleaning

Used in conjunction with the correct solvents, ultrasonic energy is revolutionizing the cleaning of metal components, glass and precious stones. It can clean intricate shapes and inaccessible recesses of medium-sized and small components. It *cannot* clean fabrics properly, and is useless where the surface has been damaged or where no solvent for the 'soil' (matter to be removed) is available.

Millions of bubbles do the work; by hammering the surface of the components and exploding, they tear 'soil' away. The bubbles are one effect of 'cavitation,' a type of violent turbulence which occurs in fluids subjected to extreme ultrasonic influence. The transducer is of quartz or of barium titanate, a synthetic crystal-

By WILLIAM GUTHRIE

poses is often produced simply by revolving a siren fast enough to give the required frequency, or by constructing a special whistle and feeding in gas at the correct pressure.

Electronic generation of ultrasonic waves is more common and much more versatile, and this article will concentrate on electrical units 'bought off the shelf.' These use valves which produce and amplify vibrations of the required frequency.

line ceramic often preferred for its efficiency and the ease with which it can be formed into shapes that focus the energy in special places.

Applications. Lenses are ground during manufacture by a hard zirconium compound. The only means of holding a lens during grinding is by pressing it on to pieces of pitch. Consequently, before despatch, the pitch and zirconium particles must be removed. Until recently, this operation was invariably done by hand, both sides of each lens being rubbed with a solvent, then rinse-dipped. As each could be held only between finger and thumb, the process was slow. And when the lens was clean the problem was where to lay it—static charges induced by the rubbing often attracted dust and hairs.

Now several manufacturers are using a small ultrasonic bath for this purpose. After being immersed in the solvent for a few minutes, the lenses, on a wire tray, are lifted out, rinsed in clean solution, and dried in a warm blast. A batch of several dozen can be cleaned in the time previously taken for one lens. Similar methods are used for cleaning jeweller's rouge and other polishing agents from sapphire bearings. Watch manufacturers use ultrasonic baths to remove grease and swarf from gears, wheels and springs.

The gear trains of gas and electricity meters have to be scrupulously clean before assembly, as undue friction and wear caused by dust and corrosion, would cause errors. The cleaning of small, delicate gears (especially from used meters) was formerly a slow job; they had to be boiled in detergent for 20 minutes and then brushed clean individually. Ultrasonic cleaning has speeded up the process many times and has removed the need for brushing.

Another application concerns the large copper discs in the watt meters of power stations. These are finely balanced, and dust and wear upset the adjustment. The discs have to be cleaned before re-adjustment, but this presents difficulties because acid dipping, buffing, or even polishing would remove some of the metal. A firm of ultrasonic equipment manu-

facturers is helping the meter company to solve the problem.

Reconditioners of used jewellery are keen users of ultrasonic baths. When bangles and rings have been worn for some time, the hallmarks become filled with dirt and grease, and gem settings become encrusted with dirt. Half-hour boilings in soapy solutions, followed by energetic brushing (always with the danger of loosening the stones) were formerly necessary. Now ultrasonic cleaning is speeding the process—and making it safer.

Conveyerized Baths

Many small precision components can be cleaned at one time in a fairly small bath—a typical size would be 9in. by 8in. by 6in. deep, with a capacity of about a gallon of solvent. In the U.S.A. mass-production firms are already using conveyerized baths for cleaning car and aircraft parts. For example, the General Motors Corporation use conveyerized cleaning to remove protective grease and metal chips from the inaccessible recesses of steering boxes, which would otherwise have to be partially dismantled before fitting, brushed as well as possible by hand, and re-assembled.

Comprehensive arrangements are made to ensure that the solvent is continuously cleaned by filtration and distillation, that each component is

rinsed in vapour as well as in liquid, and that the air streams used for drying are controlled for temperature and humidity. In other applications, the ground faces of small castings which have to be mated are cleaned ultrasonically, with consequent closer mating.

British conveyerized baths have been slower to appear, but may be the better for it. Several prototypes of the Kerry-Mullard bath have been installed on a trial basis with great success, and production is expected to begin early this year. Their applications are not in the 'traditional' ultrasonics - using industries like watch-making, but in the assembly lines of manufacturers of hydraulic systems, refrigerators, and diesel injection pumps.

A special unit, still in initial stages of development by Dawe Instruments Ltd., of Ealing, will speed the production line checking of jet engines used in British airliners. Here, ultrasonic cleaning would be one of a chain of operations in the testing of turbine blades for flaws which have occurred in service.

The process used is the 'Magna-flux.' This involves the use of fine magnetic powder which adheres to the blade and shows up surface flaws under ultra-violet light. But close adhesion, which is essential, demands that the surface be scrupulously clean. And as turbine blades are continuously subjected to blazing



Ultrasonic flaw detection has reduced from weeks to days the time for inspecting spelter dipping baths at the metal window factories of the Crittall Manufacturing Co. Ltd. Readings are taken at check points and compared with previous readings. Thin spots are then welded over

hot kerosene fumes, the cleaning problem is enormous.

Scraping or abrasion would damage the surface. The present method is to boil the blades, hundreds at a time, in vats of detergent, then scrub them by hand. Often several boilings and scrubbing are called for, and the whole process is a bottleneck in jet engine reconditioning. The problems in designing a conveyer bath are: (1) to fix the correct 'dwell time' for each blade in the bath; (2) to discover the best solvent and optimum temperature; and (3) to get the necessary machinery built.

Cost. A small ultrasonic cleaning bath, dissipating 50 watts of energy into about a gallon of solvent, costs £250. Larger types — with bigger tanks and more than one transducer — cost up to £5,000. Conveyerized baths are built to customers' orders and are much more expensive.

Measuring

Gauging the depth or thickness of metal structures presents special problems where only one side is accessible (as with a pipe or closed cylinder) or where the area is very large (the side of a ship). At present, X-rays and gamma rays are commonly used in such circumstances.

Both are very expensive and neither is portable. Moreover, time has to be allowed for developing plates. Some skill is required of the operator, and he is exposed to the radiation. (The Medical Research Council, in their report this year on the dangers of nuclear bomb test radiation, said that X-ray apparatus could be more dangerous.)

Ships' sides are continuously corroded, outside by seawater and inside by cargoes like crude oil. The cor-

rosion can endanger the ship, so Lloyds have drawn up schedules for the inspection of different types of ship. The usual method—drilling holes at set points, inserting a gauge, and then riveting the holes—is expensive and unsatisfactory; bad plugging causes seepage, which increases corrosion. Since the cumulative waste of the system is obvious, Shell Tankers Ltd. have experimented successfully with an ultrasonic method.

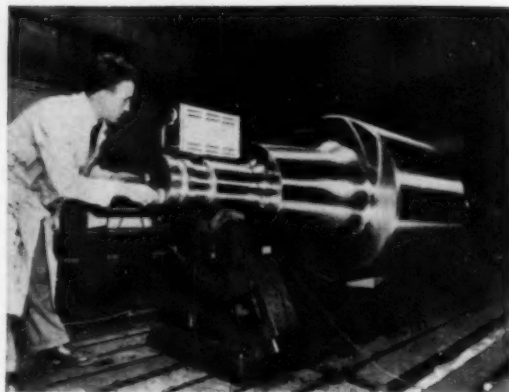
In this case, the gauge makes use of the fact that sound travels at a known speed through metals and hard homogeneous materials like Perspex and glass. The energy is generated electronically in the same way as for cleaning purposes, but rather less power is required, so that battery operation and portability are possible. Energy is transmitted to the material under test by a simple probe, which is actually a small crystal transducer. Good contact is essential, so paint or rust has to be

removed. The ultrasonic waves travel from the probe to the opposite side of the material, which reflects them.

The apparatus is designed so that a constant hum is heard on headphones worn by the operator. As he applies the energy, he tunes the instrument to the resonant frequency of the material, indicated by a sharp increase in hum. The thickness is then calculated quite simply from a scale.

Refinements are built into some instruments so that they can be used by untrained personnel for assembly-line testing. For example, one available model incorporates a 21in. cathode ray tube. A motor rotates the tuning control continuously. Instead of listening for hum, the operator watches the screen, where the thickness is shown in inches or centimetres. Nevertheless, the simpler gauge is essential for portability in locations like the inside of ships' hulls and oil refineries.

Oil pipelines corrode rapidly. Sometimes their contents are at high temperatures and pressures. Apart from the danger of a burst, the corrosion causes waste and holds up production. One safety method is to close down sections regularly and replace all pieces of a certain age. This causes frequent hold-ups and is annoying, to say the least, if it turns out that replacements were not really needed. Ultrasonic gauges enable



Armstrong Whitworth Ltd. use a Kelvin and Hughes flaw detector to check turbine shafts. Ultrasonic flaw detection is quicker, safer, and sometimes more accurate than X-rays or gamma rays

Ultrasonic flaw detectors can be more accurate than the best X-ray equipment and can show up cracks which would be invisible under all but the most powerful microscope.

the engineers to put off until the last safe moment the replacement of corroded parts.

At the metal window factories of the Crittall Manufacturing Co. Ltd., the frames are galvanized by dipping in huge baths of spelter. This spelter corrodes the steel lining which has to be checked from time to time as a leak would be disastrous. Previously the brickwork was demolished, the bath removed, and the sides measured physically. These spots were then welded over and the bath rebuilt, having been out of commission for a week or more.

Now, without dismantling, the bath is regularly emptied and examined at test-points with an ultrasonic thickness gauge. Results are charted and compared with previous figures. Thin spots are made good, and the bath is back in use after about a day and a half.

Ultrasonic thickness - gauging is used extensively in the production of steel-bladed propellers at de Havillands. The propellers are fabricated from sheet metal around a core of seamless steel tube. Outwardly, this is cylindrical, but its internal contours are complex because they are ultimately responsible for the shape and strength of the unit. They therefore must conform to exceedingly narrow limits before dispatch from the tube works. The measurement

defied all attempts until an ultrasonic gauge was used.

The gauge also plays a vital part in several stages of fabrication at the de Havilland works. It is used to check wall thicknesses after 0.001in. has been skimmed externally; to check thicknesses after each of two furnace operations; and to make yet another check after an internal abrasive process.

Cost. Portable, battery - operated thickness gauges vary between £260 and £450. A visual-gauge instrument costs up to £900.

Non-destructive Testing

One new ultrasonic flaw-detector works automatically. It is capable of controlling (for example) the large-volume production of strip metal, glass or hard plastic.

The equipment is arranged so that an ultrasonic beam continuously scans the product as it passes on a conveyer belt. If the thickness or density varies beyond pre-set limits, the conveyer line stops and lights flash or a bell rings. Thus quality

control requires a minimum of human inspection.

Such equipment is expensive and is made to order. So far as is known, there has been only one installation in Britain. This is connected with an atomic energy project.

Simpler, portable, and more versatile flaw detectors have been in use since the middle of the 1939-45 war. They closely resemble thickness gauges in appearance and operation, and depend on the same principle of reflected ultrasonic waves. In flawless material, the waves applied by the probe to one face will penetrate till they are reflected by the opposite face. A crack, air bubble or foreign matter will intercept the waves and reflect them prematurely.

The earliest applications of ultrasonic flaw detectors concerned the testing of aircraft components like castings and nuts and bolts. Such equipment can be more accurate than the best X-ray detectors, and can show up cracks which would be invisible under all except the most powerful microscope. Nowadays it is also used for checking welds and forgings.

One British installation which has aroused interest in the U.S.A. is at Goulds Foundries Ltd., Tredegar, Monmouthshire, where a method has been devised for checking iron castings produced by the Meehanite process. The castings are produced mainly for the car industry and Goulds wanted to guarantee them—a thing which no foundry was then able to do.

Selective destructive testing was wasteful and inconclusive. X-rays were too expensive, and gamma rays too slow. Cast iron is not easy to test with ultrasonics but, in co-operation with Kelvin and Hughes, Goulds' chief engineer devised a technique which is based on the special calibration of a standard flaw detector with a known sound casting as the norm. As a result, the com-



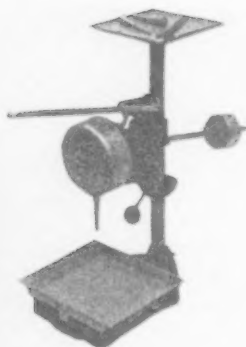
SCIENCE PROSPECT



Batco Tools Ltd. use a Mullard 50 watt drill for jobs which could not be done in any other way—the slotting of ceramic bushes and the precision machining of thin glass components



Ultrasonic drills have developed considerably during the past few years. Early models (as on the right) had elementary controls and required constant supervision. Now there are semi-automatic machine tools like the Kerry-Mullard 200 watt model above



pany are now able to guarantee their castings. Interest has been so great that Goulds are considering extending their production range.

Cost. The cost of a simple flaw detector is between £400 and £500. Automatic installations cost from £2,000 to £300,000 according to their complexity.

Machining Hard Materials

Soft metal tools, used with ultrasonic drills, perform cutting operations on hard materials which cannot be done in any other way. Wherever small amounts of hard material have to be removed within close limits, the use of ultrasonics provides what is often the only answer.

Cutting is done by an abrasive slurry whose particles are excited into a violent hammering action be-

tween tool point and workpiece. Each particle chops off some material. Some may become embedded in the tool point, hardening it.

The tools, which are easily fixed and removed, can be of any metal, but are generally of mild steel. They can therefore often be shaped by the user to his own requirements. This is important as the cut, performed by reciprocating action instead of a revolving edge, is a replica of the tool shape. Squares, holes, slots and impressions can therefore be cut with equal ease.

Here are some of the things which ultrasonic drills—laboratory curiosities only a few years ago—can now do: (1) Cut a slot $\frac{1}{16}$ in. by $\frac{3}{16}$ in. in glass 2mm. thick—time, 20 seconds; (2) machine a tungsten carbide wire-drawing die to correct size after

sintering—time, eight to ten minutes for each face; (3) cut a filament of germanium 0.018 in. thick for a transistor.

The power of industrial drills has been increased from 50 watts to 2,000 watts. The latest model, a machine tool in every sense of the word, can work to a limit of 0.0005 in. in any hard substance.

For precision working of hard materials the ultrasonic drill can often replace the diamond-impregnated wheel. A wheel was formerly used by one company to 'cut' sintered tungsten carbide. It was expensive, needed skilful setting up, and left rough edges which required lapping. Now the company use an ultrasonic drill, which is simple to set up, cheap to run, and leaves clean edges.

Ultrasonic drills are used to cut up to 12 holes at a time in ceramic spacers for miniature valves; to dice hundreds of transistor crystals in less than a minute; and to cut several hundred jewel bearings in a minute. The process is well suited to brittle substances as it imposes no strain on the workpiece as a whole—an important consideration in the manufacture of transistors and the cutting of glass and porcelain. It has, however, to give way at present to other methods when the amount of material to be removed is relatively large.

Batco Tools Ltd., a firm of tool-makers in South London, bought a 50 watt ultrasonic drill two years ago to make their machining equipment as comprehensive as possible. They find that the uses in their works of this small, early, and relatively cheap tool are very limited; the con-

Because aluminium and other light metals can be so easily soldered by ultrasonics, they now have more opportunities to replace the normal 'solderable' metals like brass and copper.

trols are elementary and work has to be constantly supervised. Since installation it has done the equivalent of about ten days' continuous work. But it has performed tasks which could have been done in no other way.

Among these are the cutting of slots in Sintox (ceramic) bushes, and machining tangential grooves in glass tube. An outstanding job was the drilling of 150-odd rectangular holes $\frac{1}{8}$ in. by $\frac{3}{8}$ in. by $\frac{1}{16}$ in. in plate glass, part of an evacuating pump. The holes were then joined by grooves cut in the form of a cross.

Metal Coating

Ultrasonic energy applied to certain molten metals greatly increases their 'wetting' power—that is, their ability to spread over and adhere to surfaces. This quality is due to the cavitation ('bubbling') which is exploited in cleaning applications.

It is especially useful in tinning 'difficult' metals, like aluminium, for soldering. Aluminium, like most of the other light metals, is in its normal state coated with a thin but tenacious oxide film which resists all soldering attempts. Cavitation caused by ultrasonic excitation of a pool of molten solder destroys the oxide film, prevents its re-formation, and makes tinning and soldering easy.

This means that aluminium and other light metals can replace the normal 'solderable' metals in many

products, with advantages in lightness, cheapness, and (sometimes) corrosion-resistance.

For high fidelity reproduction of sound the cone of a loudspeaker must be kept as light as possible. The voice coil is wound on the centre, which makes the widest excursions, so its inertia must be low. Wharfedale Wireless Works, Idle, Yorkshire, use aluminium wire for the voice coil because of its lightness. The tinning and soldering of the ends of the coil would be difficult without ultrasonics. The ends are dipped for two to three seconds in a small ultrasonic bath and are then ready for soldering. The soldering technique was improved recently by experimenting to find the optimum frequency for the bath. There has not been a single voice coil failure due to faulty soldering, and Wharfedale are so pleased with the process that they are extending it to other products.

Developments

Enough has been said to show that the British ultrasonics industry, though still relatively small, is likely to enjoy steady, if not spectacular growth. Some companies specialize in one or two equipments; others

explore the entire field. Industry's ignorance of what ultrasonics can and cannot do is their main obstacle.

The possibilities are enormous. Many developments are at the experimental stage. Some will not get beyond it—but most of the others await either progress in different fields or the production of ancillary equipment.

For instance, it is known that if molten steel is treated ultrasonically castings made from it will have a greatly refined grain structure. But the commercial exploitation of this technique will have to await the production of intricate electro-mechanical equipment to withstand the temperatures encountered.

Again, it has been found that ultrasonic excitation of the oil used for quenching steel greatly speeds the hardening process. The bubbles produced by cavitation break down the vapour blanket which appears to insulate the steel momentarily from the cooling oil. But more know-how about oils, temperatures and transducers will be required before ultrasonics can be used to save furnace time and fuel.

Fatigue-testing and 'heatless' welding are among developments which seem nearer realization.

Fatigue-testing is normally done by vibrating the metal or component at low sonic frequencies—between 25 and 150 cycles per second. Each test, however, takes two weeks or more. Experiments show that the test can be expedited about 100 times by raising the frequency to the ultrasonic border of 18 kilocycles per second. Once the new method has proved reliable it may be of extreme value in the aircraft industry.

In ultrasonic welding the surfaces to be joined do not have to be scrupulously clean and external heat is not necessary. The technique is limited at present to joining one piece of metal up to 0.025 in. thick to another 1 in. thick.

END



Ultrasonic tinning speeds up the soldering of aluminium coils at Wharfedale Wireless Works. Corrosive fluxes are no longer needed—and there are fewer failures

MANAGEMENT AT WORK

Speed-up for Phone Bills

EDINBURGH has streamlined its trunk and toll call accounting by installing a new type of automatic and electronic punched card machinery. The system has taken a long time to evolve. If the Edinburgh experiment proves successful it is hoped to bring other telephone areas into line.

An operator making a trunk or toll call has to record the caller's number and exchange, the number required and the time of the call. This is now done merely by making pencil marks in the appropriate spaces on a punched card blank. Marked cards are then fed to a photo-electric scanner which picks up the markings, however faint, and punches them accordingly.

In this way the primary carrier of information becomes a punched card. The data needs no intermediate processing before it can be fed into the normal accounting machinery. By cutting out one stage of the normal punched card routine, much time is saved and errors are reduced. The sensing and punching mechanism has, in any case, a built-in verifier which rejects faulty cards.

A similar system has been used with success in the United States for sending out gas and electricity bills. There, the meter reader is now obsolescent. Consumers are sent meter cards which they fill in by marking on them with a pencil how the various dials appear to stand. Mark-sensing apparatus interprets and punches the cards, which are then used in an automatic invoicing system.

Beat the Ration

PETROL troubles have brought forward a brilliant crop of improvisations from industrial and commercial firms. Some have opened temporary showrooms in key cities, so that at least customers can come to the salesmen if the reverse proves impossible, or have started fleets of

low-consumption vehicles to eke out dwindling supplies.

One ingenious solution comes from Jenolite Ltd. To avoid unnecessary calls by representatives, the firm's newsletter now contains material for a complete direct mail service. This includes a full list of products and their code numbers, reply-paid order forms, and reply-paid request slips for representatives, technical and laboratory assistance, or specified technical literature.

Whenever a reply card is received by the firm, a fresh blank is immediately mailed back to replace it. In this way it is hoped that no drastic lowering of standards of service will be caused by the emergency.

Show Talk

MASSEY-HARRIS-FERGUSON'S stand at the Smithfield Show used a clever gimmick to put across a new tractor. Visitors were invited to pick up one of 25 telephone-type earpieces that were arranged round the stand, and listen to a technical commentary about the product. Meanwhile the tractor itself was displayed on a revolving turntable.



If you want to put across your sales message orally in spite of the bustle of a popular exhibition, why not telephone it? That is what happened at the Smithfield Show recently when Fergusons were introducing their new tractor (see: Show Talk)

The sales message had been pre-recorded on magnetic tape, made into an endless loop, and loaded into a special cassette. It could thus be played back by an otherwise normal tape recorder in continuous two-minute cycles throughout the show.

U.S. Buys British

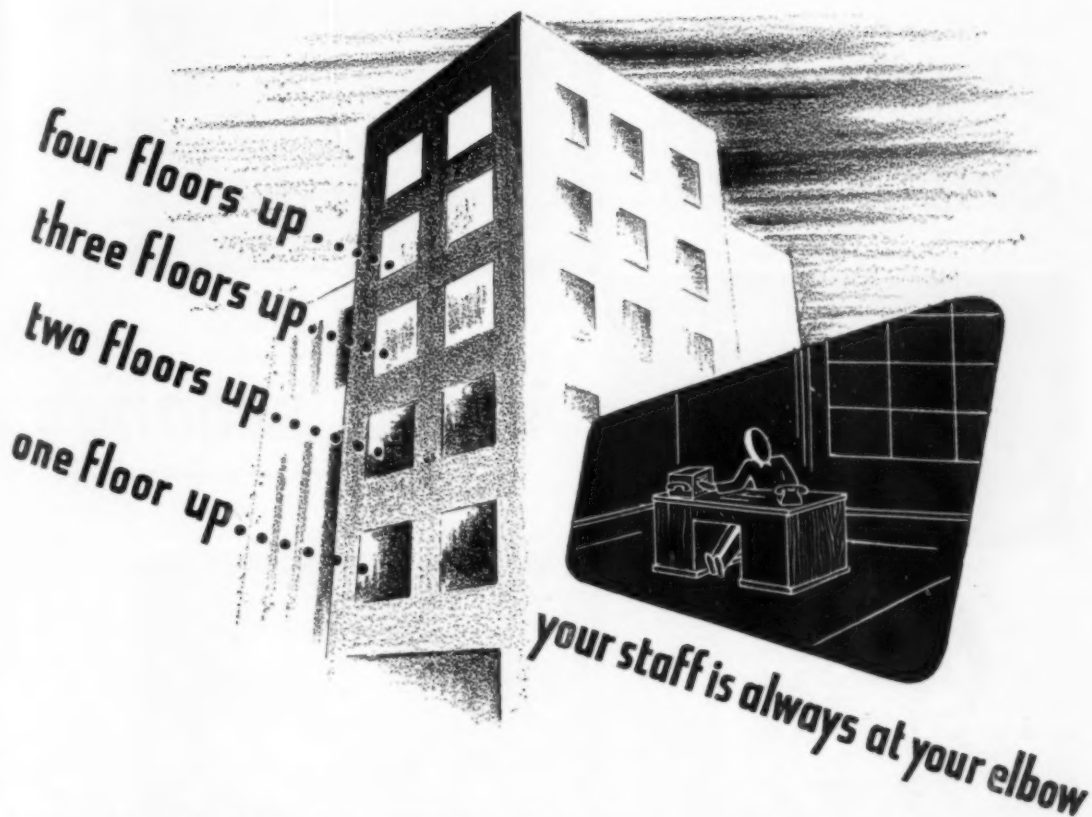
MERCHANDISING venture with a difference: Alexandre Ltd., United Drapery Group's men's wear tailoring chain, have opened two retail shops in the United States—at Arlington and Washington, D.C. There they are selling British clothes *made to measure*.

Rolls of British cloth from the Alexandre range are on display, and British staff are on hand to take customers' measurements. These are cabled to the British factory. Alexandre's guarantee to have the finished garment back in America within 30 days; they keep their word by means of a freight tie-up with BOAC.

Americans are not bespoke-minded in tailoring matters. But these British clothes are competitively priced (import duty is negligible on finished garments) and the trans-Atlantic service beats the average American tailoring establishment for speed.

Profits for All

A MEDIUM-SIZED American firm—Tappan Stove Co., of Ohio—run this unusual profit-sharing



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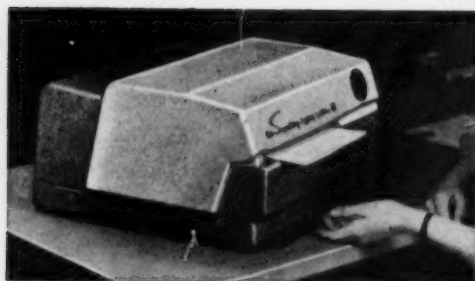
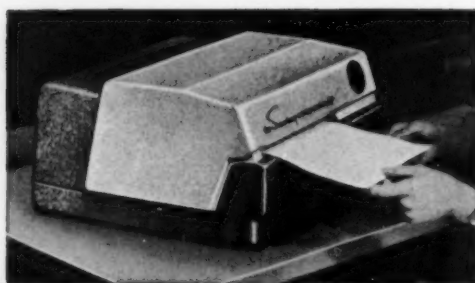
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scheme. Each year, the company set aside the following proportions of profits before tax: 10 per cent of the first 500,000 dollars; 15 per cent of the next 500,000 dollars, and 20 per cent of the balance of the profit. From the money thus obtained, 50,000 dollars are distributed evenly to all employees as a Christmas bonus. The balance is paid into a special profit-sharing trust fund, administered by a bank and an advisory council. The council has five members, of whom three are elected by employees and two nominated by the firm.

Employees may contribute from 1 per cent to 5 per cent of their annual earnings to the trust, up to a maximum of 250 dollars. The trust then credits each contributing employee with a *pro rata* share of the company's contribution. The more an employee puts in, the more he gets out. At Tappan the ratio usually works out at about two to one.

On retirement, or on leaving the firm after ten years' service, the employee receives his full share of the fund. If he leaves before ten years are up, he is paid back his own contributions in full, together with 10 per cent of the amount credited to him from the company's contribution for each full year of service. If an employee should die suddenly, his dependents receive his full share of the fund.

Profit-sharing has stern critics, both here and abroad, but this Tappan scheme seems to have vindicated itself. Within 30 days of its introduction, production had soared 15 per cent. And since then the increase has been more than maintained.

New Science Explored

UNITED Steel Cos. Ltd. are setting up a central department of operational research and cybernetics at Sheffield, headed by Stafford Beer, the former production control chief at Samuel Fox and Co. Ltd.

It is believed to be the first time that a department in this country is making a formal study of cybernetics—the science of communication and control in the animal and the mach-

ine, which seeks to study the analogy between their structure and function.

Initially the department will have a staff of some 25 research workers, including biologists, physicists, psychologists, engineers, economists, mathematicians and logicians. Its aim is to provide all branches of United Steel with advice on operational research problems, and with the trained staff to implement its proposals where necessary. It will also initiate its own research projects, and train its own recruits.

Cards are Trumps

WHAT will electronics get up to next? To gain admittance to several Los Angeles factories, employees now have to insert special pass cards into an electronic scanner which looks like a miniature letter-



This card says 'Open, Sesame' but only the electronic scanner that looks like a letter slit can read it. It is all part of a new security device, claimed to be foolproof (see: Cards are Trumps)

box. Only if the scanner recognizes the code held by invisible metal particles on the cards does an electric impulse cause the door or gate to open.

The cards are about the size of a driving licence. A million or more different combinations are possible, so that if a card gets lost or stolen it is no trouble to change the combination. One card can hold several combinations, enabling the holder to enter places with different security gradings. In this way, electronics can guard not only the works en-

trance but strongrooms, stores and other areas.

The electronic locks are not for sale. They are hired out, complete with cards, for as little as 10 dollars a month. They are claimed to be foolproof, since only the manufacturers can make duplicate cards. (With cylindrical locks a duplicate is made while you wait, and no questions asked.)

One Los Angeles firm who installed these locks linked the one at the works entrance to a time clock. Doors only opened at specified times. Latecomers therefore had to slink past the main reception area, risking an encounter with the company's top brass. Timekeeping, it was found, improved tremendously!

Literature by Air

HOLMAN Bros. Ltd., Camborne manufacturers of compressed air equipment, are one of several firms who have found airmail catalogues worth while. They published their first one in 1952. Its latest edition contains 36 pages, illustrates and describes 62 different products, and covers some 181 different machines in all. But its weight is only two ounces.

How is it done? Lithography on very thin paper is the answer. The catalogue is excellently printed in two colours. Reproductions come up better than many letterpress illustrations because of the very fine screen that can be used on uncoated paper with the litho process.

Only snag is that printing litho is rather more expensive than letterpress. But in this case it is worthwhile, since litho-catalogues are the only way in which full literature can be sent abroad without prohibitive postal charges or undue delays.

Scientific Selling

THE Canadian Retail Hardware Association recently opened a 'sales laboratory' at its Toronto headquarters. This is a mock ironmongery store, complete in every detail, and fully stocked with merchandise, which was built in co-operation with a number of leading

manufacturers.

It will serve as a research centre for modern hardware merchandising. For instance, one of its functions will be to provide a testing ground for display material. By incorporating all the latest ideas on fixtures, design, lighting and layout it will demonstrate to retailers the advantages of modernization.

Speaking at the official opening, Joseph E. Maylor, C.R.H.A. president, said: "The industry has, for years, recognized that there is a need for a clearing house on merchandising ideas, methods and displays produced by its manufacturers. At present less than 25 per cent of all displays furnished by manufacturers are used by retailers! Large sums of money are wasted each year by manufacturers in their efforts to be of assistance to retailers and consumers. Often this wastage is due to some fault which could have been corrected by well-advised advance planning."

Similar problems face manufacturers and retailers in this country. But instead of running a merchandise laboratory on these lines, the Retail Distributors' Association concentrates on promoting better shop management. Its report, 'An Investigation into Operating Methods in the Hardware Department of a Store,' is an excellent example of this.

Non-Profit Consultants

ALREADY operating from offices in London is the National Union of Manufacturers' Advisory Service Ltd., a newly established non-profit-making company. It was formed on January 1 to continue the N.U.M.'s previous advice set-up—a consultancy service for smaller firms—on a larger, more self-supporting scale.

At a ceremony to launch the new company, G. L. Page, the managing director, said: "There is enough work in the field of work study alone to keep all our management consultants fully engaged for a generation. But . . . consultants find working for small firms less attractive—they find selling costs high. Manufacturers are reluctant to use their services—

they are suspicious of their motives. One side is reluctant to sell, the other is reluctant to buy.

"One of the jobs we have been specially happy to do is to find ways of bringing them together to their mutual advantage. We cannot possibly provide all the specialist help or the temporary professional assistance which our members need. But since they so often prefer to come to us in the first instance we can often diagnose the most effective way of using consultants and guide them in their choice."

Employees on Trust

TIME clocks have been abolished at V. Siviter Smith and Co. Ltd., Birmingham designers, photographers and photo-engravers. Instead, each employee provides his own records of hours worked.

This is done on what is called an 'honour card.' The cards have daily spaces covering a period of four months. They show ordinary hours worked less time lost, if any, overtime and weekly overtime total. Two main conditions on which the firm insist are (1) that all entries should be in ink, and (2) that cards should be kept readily accessible.

How is this system working? It was installed last April and since then Siviter Smith have had no cause to complain. On the practical side, it has been found easy for the wages

clerk to go round the works each week and enter up his figures from the honour cards. The unions, who were consulted before the system was adopted, are quite happy about it. But perhaps the most important



This employee is on his honour—to record accurately his exact attendance times. No time clock watches over him, only his own conscience. Foolish? No, the scheme is reported to be succeeding (see: Employees on Trust)

point is this: the company feel that the responsibility and integrity required from each employee have had an excellent influence on the working atmosphere in the firm.

Business Bookshelf

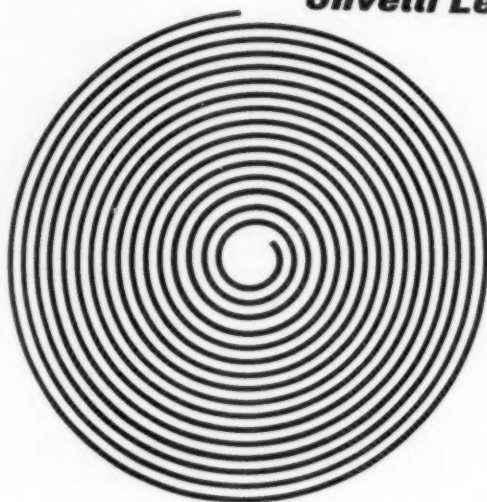
INDUSTRIAL ENGINEERING HANDBOOK, edited by H. B. Maynard (McGraw-Hill) 109s. The editor is president of the Methods Engineering Council, Pittsburgh, and he has got together 81 of the leading experts, from both sides of the Atlantic, to write chapters on every aspect of his subject. After the introductory section, the subjects dealt with in later sections are Methods, Work Measurement, Predetermined-elemental-time Standards, Wage Payment, Control Procedures, Plant Facilities and Design, with a final section on 'Other Aspects of Industrial Engineering.' This includes chapters on office meth-

ods, safety, operator training, suggestion systems, operations research and automation. The whole book is surely one of the most useful it would be possible to have on hand, and it would be even more useful if someone could be persuaded to read all 1,440 pages systematically.

THE MAKING OF AN ADMINISTRATOR, edited by A. Dunsire (Manchester University Press) 10s. 6d. A series of lectures delivered at Exeter by leading administrators, and well worth reading by all in positions of executive responsibility. In his lecture



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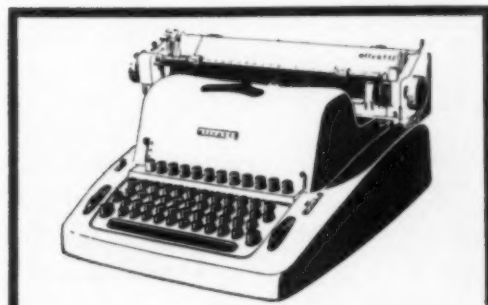
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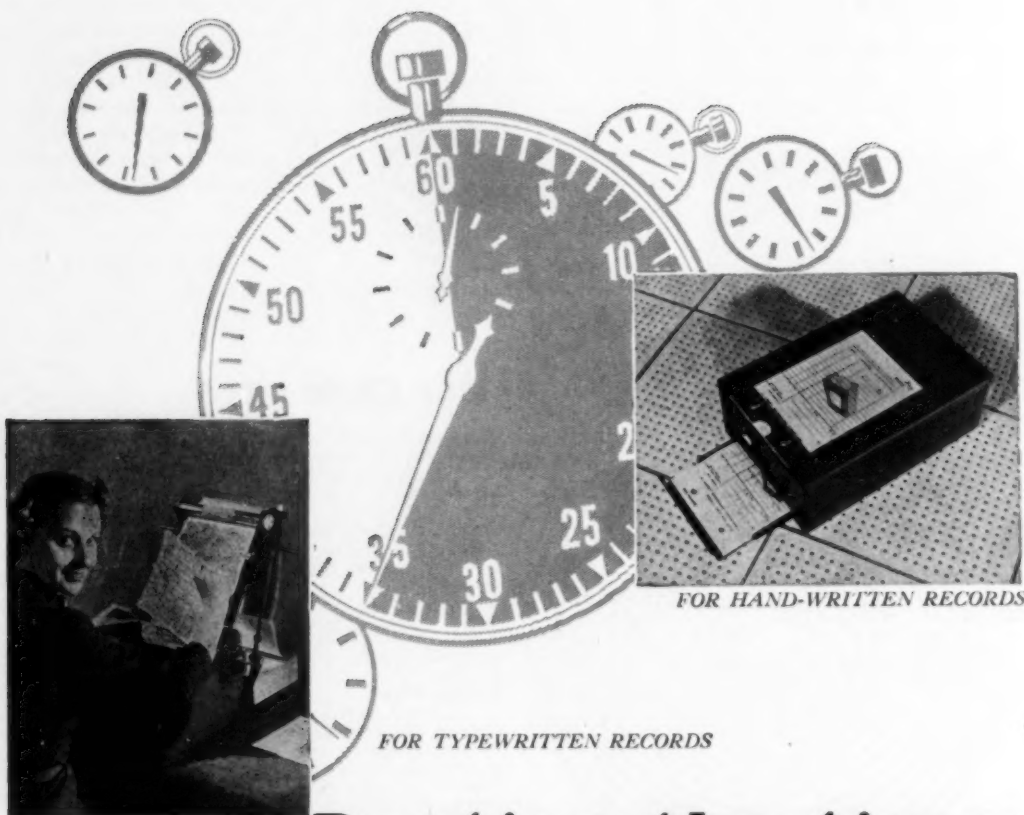
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on 'Administration: What is it? And how can it be learnt?' Lord Bridges (then Sir Edward Bridges, permanent secretary to the Treasury), lists some of the qualities required by a general administrator. One of them is a sense of timing. He illustrates the art of letting two opposing factions argue out a problem until they reach deadlock, then coming forward at the right time with a suggested solution.

THE CHALLENGE OF CHANGE by Lawrence Thompson (Oxford University Press) 5s. A short account of the Duke of Edinburgh's Study Conference at Oxford last July.

STOCK OWNERSHIP PLANS FOR EMPLOYEES. Published by the New York Stock Exchange, this booklet gives full details of the employee ownership plans of 20 leading American companies. It also lists all the companies which since 1947 have adopted plans for issuing stock to employees, officers or directors, and have had them listed on the Stock Exchange. The extent to which a property-owning democracy has already been created in the United States can be gleaned from the fact that in the last nine years approximately 40 per cent of listed companies have adopted stock purchase or stock option plans.

ELECTRONIC COMPUTERS, Principles and Applications, edited by T. E. Ivall (Iliffe) 25s. Covers both digital and analogue computers; written primarily for technicians and engineers. It describes, with diagrams, the principles of operation and the actual wiring arrangements of particular computers. The book is, however, also of value to business executives, for it covers a highly technical subject with the minimum of technicalities, and in its later chapters it discusses actual business applications of computers and the prospects for future computers.

MANAGEMENT TRAINING IN THE BUILDING INDUSTRY (British Institute of Management) 5s. Report of a study group, prepared and published in collaboration with the Board of Building Education.

MODERN MARKET RESEARCH, A Guide for Business Executives by Max K. Adler (Crosby Lockwood) 15s. A very general little book designed to acquaint the lay business executive with what he can buy in the way of market research, the various types of surveys and their relative uses and costs.

BARRIERS TO NEW COMPETITION by J. S. Bain (Oxford University Press) 45s. The author is professor of eco-

nomics at the University of California. He has made a study of competition in 20 American manufacturing industries, and has found some relationship between conditions of entry into an industry and profit levels and output restrictions. Nevertheless, his finding that 'product differentiation' is the chief source of barriers to entry into an industry, weakens his whole case for a more stringent form of anti-trust law. Product differentiation creates its own form of competition between products, at the same time as it weakens the prospect of some forms of competition.

F.B.I. REGISTER OF BRITISH MANUFACTURERS, 1957 (42s. for non-members, 15s. for members). Official register of the Federation of British Industries, classifies the 7,500 member firms and the 300 member trade associations, both alphabetically and by product.

TAX PLANNING WITH PRECEDENTS by D. C. Potter and H. H. Monroe (Sweet and Maxwell) 50s. Second edition of a useful work describing the various arrangements, such as deeds of covenant, separation deeds, infant settlements, discretionary settlements, marriage settlements, partnership schemes and pension schemes by which a taxpayer may so arrange his affairs as to minimize his tax burden, within the law.

TAKE HOME BOOKS (Newman Neame, 390 Euston Rd., London W.1.). A new service providing fortnightly booklets on topical subjects, specially written for employees. Subscribing companies are provided with wall racks and a regular supply of the booklets as they come off the press. Subjects as far apart as psychology, atomic power and taxation have been dealt with, and so far the booklets have been received by employees with considerable interest. Subscription varies with the number of copies needed.

STATISTICAL QUALITY CONTROL (H.M.S.O.) 5s. A booklet produced by the European Productivity Agency and giving details of progress in each European country.

THE SECRETARY'S GUIDE TO THE RESTRICTIVE TRADE PRACTICES ACT, 1956, by Lord Meston (Corporation of Secretaries) 12s. 6d.

ACCOUNTS FROM INCOMPLETE RECORDS by J. G. Simpkins (Gee) 15s. Third edition of a well-known brief text.

CREATIVE COMMUNICATION by E. L. Cady (Chapman and Hall) 20s. A short text on the art of writing, by an American management consultant.

TRADE UNION LAW by H. Samuels (Stevens) 12s. 6d. Fifth edition of a work first published in 1946. Clearly written, and of great value to industrial concerns and to trade union officers, as well as to their lawyers.

BUSINESS PRACTICES, TRADE POSITION, AND COMPETITION by Oswald Knauth (Oxford University Press) 24s. Written by a professor of marketing at Columbia University, this book succeeds rather well in pointing out the faults in the classical theories of competition and monopoly, but succeeds less well in trying to replace them with a new theory.

A HANDBOOK OF TYPE AND ILLUSTRATION by John Lewis (W.S. Cowell Ltd., Butter Market, Ipswich, Suffolk) 30s. Deals very attractively with the printing and production of illustrated books.

THE ECONOMICS OF SOVIET STEEL by M. G. Clark (Oxford University Press) 60s. By an associate professor of Cornell University, this is the 25th detailed study of an aspect of the Soviet economy, produced by the Russian Research Center at Harvard University.

SELECTION AND TRAINING OF FOREMEN IN EUROPE (H.M.S.O.) 12s. 6d. An O.E.E.C. report prepared by two experts of the International Labour Office.

MARKET RESEARCH METHODS IN EUROPE (H.M.S.O.) 9s. An O.E.E.C. report prepared by a German expert.

HUMAN RELATIONS IN INDUSTRY (H.M.S.O.) 18s. Report of O.E.E.C. conference in Rome, January-February, 1956.

HOW TO WIN CONFERENCES, MEETINGS AND INTERVIEWS by W. D. Ellis and F. Siedel (Elliot Right Way Books, Kingswood, Surrey) 7s. 6d. A reprinted American text, lightly written, giving numerous anecdotes to illustrate the points made.

CLEAR AND PLAIN by H. Dennett (Efficiency Magazine) 3s. 6d. A short booklet on the art of writing clearer business English.

Are Your Costs and Prices Realistic?

Does your thinking take account of changing values? So many things have gone up in price—labour, machinery, supplies, professional services and finished goods. This table, based on the retail price index, gives you a rough set of conversion factors for bringing your values up-to-date. For example, if you spent £100 on a machine in 1931, for which year the conversion factor is 2.71, then you could hardly be surprised if a similar machine now costs £271. It may actually cost more or less, but you would expect values generally to be around 2.7 times the 1931 level. This table will be brought up-to-date every quarter, but published monthly, for handy reference.

Year	Con- version Factor	Year	Con- version Factor
1913	= 3.98	1934	= 2.84
1919	= 1.87	1935	= 2.77
1920	= 1.60	1936	= 2.71
1921	= 1.77	1937	= 2.58
1922	= 2.18	1938	= 2.55
1923	= 2.28	1939	= 2.48
1924	= 2.28	1946	= 1.66
1925	= 2.28	1947	= 1.56
1926	= 2.32	1948	= 1.46
1927	= 2.38	1949	= 1.42
1928	= 2.41	1950	= 1.38
1929	= 2.43	1951	= 1.26
1930	= 2.53	1952	= 1.15
1931	= 2.71	1953	= 1.12
1932	= 2.77	1954	= 1.10
1933	= 2.84	1955	= 1.05

Management 'Fault Finding' Gets Good Results

By J. W. TEMPERTON

Firms sometimes waste a lot of money on trying to cure the symptoms of inefficiency—simply because they are too close to the problems to spot the real causes. Here are case-histories showing how accurate diagnosis by independent experts can lead to big improvements which cost very little

MANY firms, in their efforts to increase efficiency, find that their main difficulty is the accurate diagnosis of their problems. This difficulty may arise because the management are too close to the problem to see it clearly, or because they become pre-occupied with symptoms and so fail to discover the fundamental cause of the trouble.

For example, the management of a medium-sized furniture factory spent a considerable amount of time and money on trying to improve the layout and work methods in their machine and assembly shops so that a better work flow could be obtained, output increased, and costs reduced.

Their efforts did not, however, have the desired results, and they were still troubled with congestion on the shop floor, and delay in getting goods completed on time. Shortage of space was also causing difficulties, and was considered by the management to be one of the main problems.

Eventually the problem of improving the work flow was passed to a firm of industrial consultants, who made a thorough investigation. Their

subsequent diagnosis showed that the trouble was not caused by the conditions in the factory itself, but by the system of planning and control.

The consultants therefore recommended that the office should be reorganized, and a completely new system of production planning and control introduced. The basis of the new system was a closer link up between the sales and manufacturing departments, and the setting up of a production control centre in the works through which all incoming orders for both machine and assembly shops were routed.

Standardization

In addition, the whole range of timber piece parts used in the construction of the various items of furniture was revised. As a result, it was found possible to eliminate a considerable number of minor variations in piece part design, so that a much greater degree of standardization was obtained.

In a comparatively short time the effect of these changes was felt

throughout the factory. Although no alterations of any kind had, up to this time, been made in the shop layouts, the flow of work through the machine shop in particular was greatly improved.

As a result, the replanning of the machine shop, which was dealt with at a much later stage in the application, followed very different lines from those originally envisaged by the management.

One of the immediate effects of the changes was that the increased flow of piece parts from the machine shop highlighted the urgent need for a corresponding increase in output from the assembly shops. Much of the work done in these shops was concerned with the assembly and finishing of good-quality furniture, which involved a considerable amount of hand-finishing work.

For this reason the management were reluctant to agree to any change in the actual methods of assembly which might jeopardize the existing quality standards. And for the same reason they were opposed to the introduction of an incentive scheme,



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as they feared that it would encourage the operators to put quantity before quality.

Their anxiety on these points was however soon allayed. The detailed investigation of the assembly departments made by the consultants showed that the comparatively low level of output was not primarily due to bad methods or a poor work effort on the part of the operators, but to the system of material supply.

There was no clear line of demarcation between the machine and assembly shops, and no centralized source of supply for any of the materials required by the assembly operators. As a result, skilled craftsmen spent an unduly high proportion of their time—often as much as 30 per cent—in either fetching and carrying their own materials, or in waiting for piece parts which they required to finish a particular job.

To overcome these difficulties, the consultants recommended that a piece part store should be established between the machine and assembly shops, so that all component parts for each piece of furniture could be collected in one place and checked against a parts list before they were issued to the operators.

The erection of this store actually reduced, by a considerable amount, the total floor area available for both the machine and assembly shops. But, although this appeared to contradict the original assumption that shortage of space was one of the prime causes of difficulty, the results obtained by the introduction of the store soon justified the measures which had been taken.

In a little over six months from the time the reorganization began, output from the factory had risen by over 20 per cent. At the same time direct labour and material costs had fallen by over 12.5 per cent.

In the assembly departments, productivity rose by an average of 25 per cent, and in certain individual cases by over 30 per cent. As a result, savings were made at the rate of between £5,000 and £6,000 a year.

The additional output was being obtained from what was in fact a reduced floor area. It was estimated

that the average level of productivity per square foot of floor-space throughout the whole factory had increased by just over 15 per cent.

To operate the new scheme of production planning and control, it had been necessary to increase the works office staff. The management were at first in some doubt as to whether to increase the overheads in this way, but when the reorganization was complete, the ratio of clerical costs to turnover had fallen by nearly 3 per cent, although the staff had actually been increased by 15 per cent.

One of the most important aspects of this application was that, by ac-

In the assembly departments productivity rose by an average of 25 per cent, and in some individual cases by over 30 per cent. As a result savings were made at the rate of between £5,000 and £6,000 a year

curate diagnosis of the problems involved, the consultants were able to achieve the desired results with the minimum of difficulty and expense, and without any major alterations being made in the actual factory layout or in working methods.

Much of the work of reorganization was done by the firm's own staff under the supervision of the resident consultant. Throughout the whole application, the greatest importance was attached to establishing and maintaining good personnel relations. It was, in fact, largely due to the willing co-operation of the staff and of the operators themselves that such satisfactory results were obtained in so short a time.

Another example of the importance of accurate diagnosis, and of the wide range of factors which may

affect industrial efficiency, is provided by the case-history of a large company which had expanded rapidly during and after the war.

In spite of this expansion—and although the turnover had practically doubled—profits were falling. The percentage of net profit was, in fact, lower than before the expansion began.

Over an extended period the management had taken a number of measures, some of them drastic, to try to improve the overall position, but none had met with any marked degree of success. As the position deteriorated, and the management became more and more immersed in their problems, it became increasingly difficult for them to obtain a clear and impartial view of the situation as a whole.

Efforts were still being made to increase output to offset the heavy overhead charges which had accumulated. But insufficient attention was being given to manufacturing costs, so that the rising turnover was coupled with a general fall in productivity.

In addition, the sprawling growth of the organization had obscured the originally clearly defined lines of communication, with the result that, although a policy of partial decentralization had been followed, control was weak. This position was aggravated by the fact that there was insufficient delegation of authority, so that the managing director was burdened with a mass of detail work.

Consultants were called in to carry out a complete survey of the whole organization. The recommendations made in the survey report were approved by the board, and the consultants asked to put these recommendations into effect.

The first stage of the reorganization called for a physical contraction of the whole group, and a tightening up of the managerial structure so that lines of authority were once more clearly established, and the managing director was relieved of much of the day-by-day routine with which he had previously been encumbered.

The physical contraction was ob-



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tained by carrying out a programme of work study. This was expressly designed to increase the productivity per square foot of floor-space, enabling the same volume of turnover to be obtained from the main factory buildings, without the need for the branch departments which had previously been necessary.

That this programme was successful can be judged by the fact that, in one instance, by making use of mobile jigs and fixtures the assembly time for a product was cut from 20 minutes to 12, and the working area required reduced from 150 square feet to 80.

In another instance, the replanning of the work flow, together with some alterations in the assembly sequence, enabled stocks of partly completed work to be eliminated. In this way a whole department was freed for productive work.

One of the most urgent problems was to obtain a much greater degree of control over manufacturing costs. To do this, a system of departmental control statements and expenditure analyses was introduced.

These statements were produced weekly by a special control section which was an extension of the existing costing department and was under the control of the firm's cost accountant. In a short time the figures produced enabled the management to see clearly, for the first time, where the main wastages were occurring, and what remedial action should be taken.

Operating Costs Recovered

On the recommendation of the consultants, a research and development department was also established. Its terms of reference were to study the technical aspects of the firm's products with the aim of reducing both the material and labour content. After being in operation for a little over a year, this department had more than recovered its establishment and operating costs by the savings which it had made.

These changes were carried out over a period of three years, and during the whole of this period the

consultants were mainly concerned with fundamental reorganization, and with training the firm's own staff, either in the principles on which the company was in future to operate, or in the specialized techniques (such as work study) which it became necessary for them to know.

The results of this reorganization were impressive. A further increase in output of over 15 per cent was obtained, and at the same time there was a substantial saving in both manufacturing and overhead costs which amounted to more than £20,000 in the first three years. These savings more than covered the cost of the consultants' fees, and subsequent savings were expected to run at an even higher level.

An equally important aspect of the reorganization was that by establishing the company on a sound operating basis, the consultants had ensured that any future expansion could be made without either increased operating costs or loss of efficiency.

Diagnosis in the Office

Accurate diagnosis is equally important in dealing with problems of office reorganization. While the potential savings are not always as great as they are in the factory, satisfactory results can often be obtained, in the form of increased efficiency and reduced operating costs, even in offices employing only three or four people.

This can be illustrated by the case-history of a small company which was having trouble with the preparation and dispatch of invoices and statements. At the time the consultants took over the problem invoicing was over two months in arrears; as a result the figure of outstanding debtors was continually rising, and the firm's liquid position was in jeopardy.

In addition, it had become impossible to get an accurate weekly or monthly turnover figure. Consequently it was extremely difficult to obtain a clear picture of the overall trading position.

Various measures had been taken

to try to remedy the situation. As the volume of work was not sufficient to justify any form of mechanized accounting, additional temporary staff had been engaged. Moreover, continuous (and in some cases excessive) overtime was being worked in the invoicing department.

Tracing the Cause

The consultant's examination and subsequent diagnosis of the problem showed that the real cause of the trouble lay not in the invoicing department itself, but in the organization of the costing and estimating department.

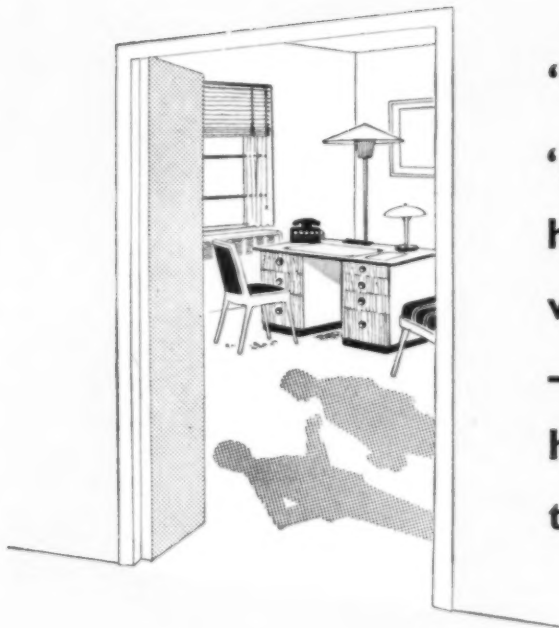
Nearly all goods sold were charged on the basis of an estimated price which was checked with the actual manufacturing cost of the job before it was dispatched. But costing was not started until each job was complete, and it was this hold-up in obtaining the cost information and checking it with the estimated prices which was the main cause of the delay in preparing the invoices.

To overcome this difficulty, the costing and estimating department was reorganized, so that costing could be started at a much earlier stage in the manufacturing process, and finished at almost the same time the job itself was completed. A strict routine was established which ensured that all costing information required from the factory was forwarded to the cost office as quickly as possible. This meant that the final prices for completed work could be sent to the invoicing department with the minimum of delay.

The benefits of the new system were soon apparent. In three months all arrears of invoicing had been overtaken, the statements brought up-to-date, and the company's liquid position improved by approximately £15,000.

Overtime working in the office was eliminated, and the temporary staff became redundant. In addition, the new procedure was used to form the basis of a weekly and monthly control system which kept the management fully informed of the current trading position.

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Simultaneous writing of company's receipt sheet and customer's payment card has considerably reduced the chance of error. Individual receipts are eliminated but customers have an exact copy of the information held by the firm

By using special forms and machine accounting, a departmental store in Oxford have revitalized their credit collection system. Results include a big saving in clerical work, an improvement in customer relations—and a valuable management tool in the form of a daily H.P. credit control.

How Systems Forms Cut Credit Collection Errors

CREDIT sales by hire purchase represents a reasonable proportion of the business done by G. R. Cooper (Oxford) Ltd., one of Oxford's largest departmental stores. Till 18 months ago, however, the firm's system of controlling the collection of H.P. accounts was hampered by traditional book-keeping methods which were prone to error and sometimes resulted in embarrassing complaints from customers who had settled their accounts but had nonetheless received arrears letters.

By re-organizing their accounting programme for credit payments—using special systems forms wherever possible—Coopers have now eliminated inefficient practices and reduced the number of errors to an absolute minimum.

In fact they have done a lot more. About six months ago they added

mechanization in the form of a specially adapted accounting machine, which has helped to 'integrate' ledger posting in the credit collection system. They have dispensed with the services of a full-time clerk without sacrificing efficiency. From management's viewpoint, a valuable

A. H. RUSSEL BIRCH

asset has been evolved: a daily control card for all H.P. ledger cards, indicating at a glance the day-to-day balance of credit transactions.

In the past, when a customer paid his regular monthly instalment at the cash desk, he received an individual receipt. At the same time, an entry was made on his personal record card, showing him the outstanding balance on the account.

From the duplicate of the individual receipt the H.P. clerk took her figures for posting to the ledgers and to the company's record card made out for the customer concerned. All these hand-written entries multiplied the chances of calculating and posting errors.

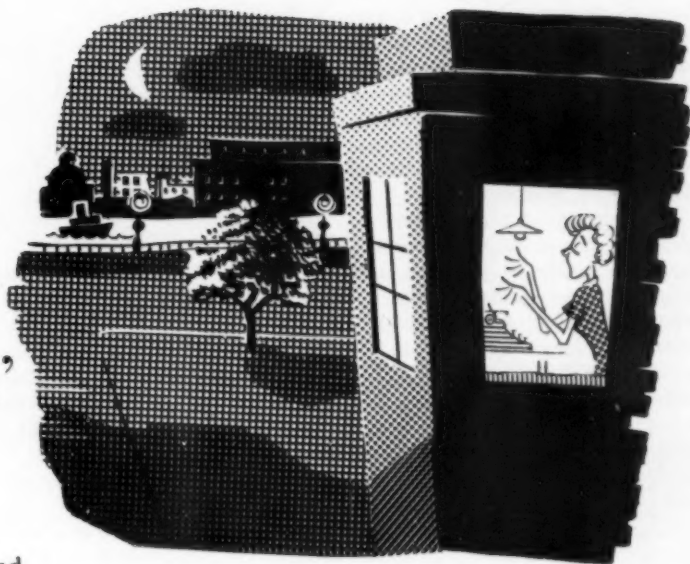
If an error occurred it could not be detected till the account had been settled. When the final payment—according to the customer's card—was made, there might be an outstanding balance in the company's records.

As the time for the next instalment came due, and no payment was forthcoming from the particular account, the normal collection procedure was followed. After a waiting period, the credit department sent out its first arrears letter. And it was not long before an irate customer demanded an explanation.

The company secretary, K. White, who is responsible for accounting, realized that the main reason for such unfortunate errors was simply a lack of adequate proofing. Once an error was made, either by the cashier or by the H.P. clerk, there was no way of detecting it. The solution

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was therefore self-evident: if some sort of check were instituted the bulk of errors would be eliminated, or at least discovered long before any embarrassing situation arose. It was, however, necessary for the proofing to be effective without consuming too much time and labour.

In conjunction with a systems manufacturer, Mr. White introduced two standardized forms: a new customer's statement of account and a daily general receipts sheet.

The statement of account takes the place of the customer's personal record of instalment payments and balances. It is marked to correspond with rulings on the cashier's receipt sheet, which is carbon-backed. (Later a more detailed explanation will be given of the relationship between the account card and the receipt sheet.) Two error-prone writing steps have been saved here: (1) individual receipts have been eliminated; and (2) posting to ledger cards is done directly from the master receipt sheet, so cutting out the individual record cards kept by the firm.

When a semi-automatic posting machine was introduced in June last year, it reduced the error possibility still further. Mr. White designed a H.P. ledger card which automatically threw up, in a special column, any amount that was overdue on an account. The principle behind this is as follows:

Immediately an account is opened, the balance due is calculated on to the ledger card, together with all other relevant information. The accounting machine then automatically lists the diminishing balance of payments, one below the other, in the appropriate monthly sections. Any time a payment is made on a particular date, it is posted to the corresponding line on the H.P. ledger card. The correct balance is automatically thrown up; if in arrears, it is entered in the 'arrears' column. In this way the clerk responsible can immediately detect 'delinquent' accounts.

Besides monthly accounts, Coopers offer customers four types of non-cash trading; hire-purchase, credit sale, short-term credit and

The diminishing balances for each instalment of an account are listed when the H.P. ledger card is initially prepared. If short payments are posted to a card, the deficiency is automatically thrown up in the arrears column, giving the credit department an immediate indication

deferred payments. The difference between these types is purely technical, and for all of them the same collection system is used. To illustrate the method more fully, we must follow an account through its various phases.

A customer—sanctioned as a good risk—has purchased a stove for £39 19s. 6d. After discussing terms, she agrees to make a down payment of £3 19s. 6d., and to carry the balance plus interest charges over 18 months, at the rate of £3 5s. 0d. per month.

Identified by Number

Immediately she signs the agreement papers, a statement of account or payment card is made out. She is given an agreement number which is entered on the card, and from now on all documentations relating to her account is identified by this number. For convenience, her name and address are also listed, as are the balance of hire, the frequency of payment, the amount of each instalment, the first payment date, and the day in the week or month when future payments are to be made.

The card is the property of the store, and merely serves as a reminder to the customer. When the transaction is completed, she returns it and in exchange is given a receipt in full discharge of the debt. The payment card has the additional advantage of saving the firm the expense of mailing invoices.

The cards fold into a handy vest-pocket size and each section is divided into three columns for date,

payment and balance. Along the sides are ruled lines, with numbers below each line representing the individual instalments. The lines correspond to the rulings on the company's master receipt sheets, and serve as a guide for correctly-positioned carbon duplication. Against the first number the customer's balance is inserted.

Next, a hire purchase ledger card is made out. This, too, is identified by the agreement number. At the top is listed the type of merchandise purchased, the interest and the rest of the information on the payments card. Below this, the H.P. card is ruled off in monthly sections, which in turn are divided into weeks on the left side. The right side is divided in the same way but is used for comments.

The customer's payment balance is inserted, and in the column alongside the diminished or scheduled balance for each further instalment is automatically picked up. When the date for the first payment arrives, the customer goes to the store's central cash desk and shows her card.

The cashier has the receipt sheet for each day of the month. On it she fills in the name, number and old balance of the customers whose instalments are paid, on that day. Underneath is a partly carbonized sheet for the date, payment and new balance columns of the sheet.

The cashier takes the customer's card, inserts it under the carbon so that just the numbered edge protrudes; aligns it with the appropriate line on the receipt sheet, and with a



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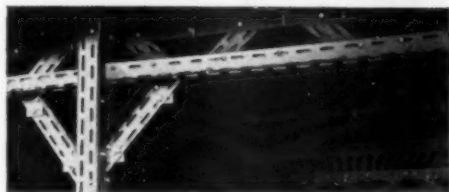
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single writing fills in the carboned columns on both the card and the sheet. To minimize the possibility of information being written against the wrong number, both receipt sheet and carbon are secured to a peg-board.

A big advantage of the present system is that the customer gets an exact copy of the store's record. The cashier need only calculate the difference between old balance and payment.

At the end of each day, the master receipt sheets are returned to the H.P. clerk for posting to the ledger cards. Should a mistake have been made in the customer's entry, it is immediately detected by comparing the new entry with the diminished balance previously listed. The store then writes to the customer and asks her to send in her card, explaining what has happened. So any errors are now corrected within 24 hours.

On the other hand, if the customer had paid only part of the instalment due—£2 on her £3 5s. payment for example—the difference of £1 5s.

would automatically be recorded in the arrears column of her card.

Ledger cards are filed by 'dates due' in standard posting trays. The firm always work seven days in arrears; this means that in actual fact accounts become due a week later. The postings having been completed, the ledger cards are returned to the tray ready for the following month or week.

Guide to Management

But before they are put away, an H.P. control card is prepared from the day's ledger cards. This indicates the outstanding daily balance and gives the management a guide to position. Since Coopers have some 700 H.P. accounts, these daily controls have proved very useful—especially in the light of present restrictions.

Accounts in arrears are noted, and in the section of the H.P. cards headed 'remarks' the action to be followed is written in. Coopers use their discretion in dealing with over-

due accounts. But as a rule, after waiting seven days, they send a first demand letter. This is not strongly worded; in fact it is more of a reminder. If necessary, it is followed up seven days later by a second reminder. Should a third letter be needed, the customer is informed that the matter will be put into the hands of solicitors.

Accounts which need special action are kept forward in the file tray. There are very few of them, particularly since the new accounting programme was instituted.

The firm feel that the goodwill engendered by the new system cannot be measured in terms of pounds, shillings and pence. But direct savings in labour can. Already the time involved in keeping H.P. records has been more than halved. When the accounting machine was installed, it saved the work of a full-time clerk. The girl operator spends no more than an hour a day for credit work; she doubles as Mr. White's secretary, and between times uses the machine for payroll.

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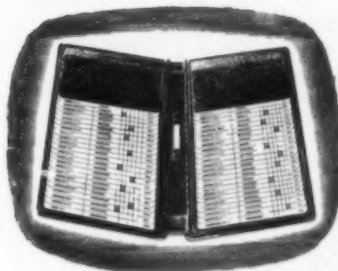
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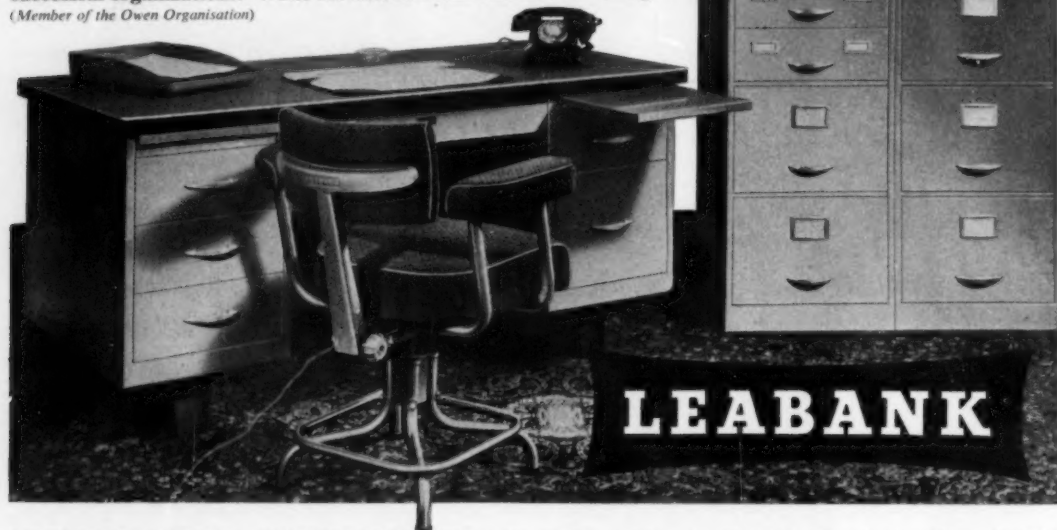
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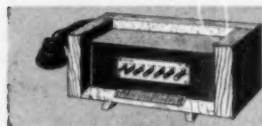
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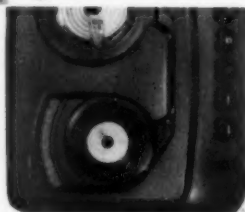
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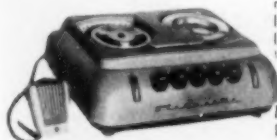
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Even Typists Wanted Jobs in This Factory

Small Firm's Training School Aids Recruitment

Setting up a 'scientific' selection and training scheme has enabled a textile factory to reduce from months to weeks the time taken to get full output from recruits. The girls earn more and find satisfaction in the knowledge that they are being equipped for a specific job.

FOR a long time W. G. Grant and Co. Ltd., jute spinners and manufacturers, Dundee, had felt that the traditional method of training girls and women as weavers in their Carnoustie factory was not efficient. So when they installed additional up-to-date looms last year they decided simultaneously to introduce scientific methods of selecting and training labour.

Grants are a small firm—the weaving factory employs a total of only 160. Realizing that they had neither the resources nor the experience to devise the scheme they wanted, they sought the advice of a firm of management consultants.

The consultants were on the premises for about six months. They asked questions, studied the machinery, noted working conditions. In co-operation with the company's work study engineer, they broke down

complex operations into component skills. Their advice was not cheap—but Grants are enthusiastic over the results and consider that every penny was well spent.

The scheme came into operation at the end of June, 1956, and since then about 35 girls have passed through the new training school (and soon a number of established workers will also take the course). The initial

By GEORGE T. RAE

results show that the average training time can be reduced from months to weeks; and that once the scientifically trained girls get into the factory they are able to increase their output at a much greater rate than workers trained under the old system. Therefore they can earn a much higher bonus and there is considerably less



In advertising vacancies in local papers Grants stress the 'career' appeal of their training scheme

of the frustration and dissatisfaction formerly evident among workers with a few months' experience.

Girls used to learn weaving by first becoming 'drawers' and 'in-givers'—helping weavers. Deafened at first by the clatter of shuttles, misunderstanding shouted instructions and bewildered by a mass of reciprocating machinery, they learned slowly, to say the least. Their job was to prepare yarn for the warp threads. After months, if not years, learners were able to take charge of a loom.

Some of them, when trained, lost heart during their first few months in charge of looms, because they found that their bonus earnings were consistently below those of their experienced companions. Their morale was as low as their pay; often they left, the firm's time and their own having been wasted.

Another disadvantage of the old method of training was that the skilled weavers beside whom the girls learned were not necessarily good teachers. Moreover, it was essential to get maximum output from the expensive new machines and this



Above left: Testing for hand and eye co-ordination—the recruit has to drop a ball through a tube and catch it. Above right: Trainees time each other during dexterity exercises. Left: Just when the worker thinks she is doing well on a loom, the instructress tests her by deliberately introducing a production hazard, like a thread break

demanding higher concentration from weavers and closer supervision from the foreman; neither, therefore, could afford the interruption in production caused by the training, on the job, of other workers.

The new scheme has overcome these disadvantages. Embracing both selection and training, it has three main purposes:

- 1—To pick out those who possess suitable abilities and aptitudes.
- 2—To reduce learning time by scien-

tifically developing the required skills.

- 3—To provide quiet quarters, away from the loom shed proper, where training is free from distractions.

A storeroom next to the loom shed was cleared for use as the interview and instruction room. Walls were soundproofed. A woman personnel officer was appointed to administer the scheme and to supervise selection tests. These measure eyesight, aptitude, dexterity and perception.

Eyesight is tested with an instrument called a stereoset, and with specially graded diagrams which measure the power of each eye. In doubtful cases an optician's opinion is sought.

Aptitude is estimated by a paper and pencil task in which sets of related diagrams have to be completed—much on the lines of Service tests. Education and writing ability have no influence here; intelligence is the only criterion.

Dexterity is gauged with devices designed by the consultants and made largely in the firm's workshops. In one test, pegs have to be transferred from holes in one board to similar holes in another, with each hand in turn, and then with both. In another, the trainee has to pick up pins from a shallow tray and stick them into holes in the board as quickly as possible, using only one hand. A third instrument tests co-ordination between hand and eye; balls are dropped in at the top and caught at the bottom.

Perception is revealed by picking out from a camouflaged background as many ciphers and letters as possible.

In all tests allowance is made for nervousness, which can be distinguished from clumsiness. Much can be deduced from the way the tests are performed.

No employee who has passed the tests has subsequently proved unsatisfactory. The standards required for 'passes' are flexible: obviously, if supply is greater than demand they can be raised.

Training is equally methodical. Some of the apparatus in the instruction room are mock-ups of factory looms. Others are just the essential parts. For instance, there is only one section of a circular loom, but this is more than adequate since it enables the trainee to develop the fundamental skill, without being mystified by a mass of moving parts.

Skills are also developed by instruments which have nothing to do with weaving as such. In one a bulb lights when a pin is inserted in lines of small holes in either side of a brass

This towel never gets wet

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PATENTS PENDING

OUTSTANDING ADVANTAGES:

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- Operates from factories' own steam supply
- A self-contained unit—easy to install
- Robustly constructed for long trouble-free service



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Patents 555062-621085 and Foreign Pats.

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FEBRUARY, 1957

plate. This develops fine finger movements.

To avoid fatigue and boredom, changes are made frequently. Half an hour on the 'loom' will be followed by 15 minutes' dexterity development. To encourage competition, girls are paired according to ability, and time each other on tests. The programme is varied still further by using film strips and short lectures about jute, its origin and its manufacture.

Lectures are given by the instructress, an experienced weaver chosen not only for her skill but for her helpful and pleasant manner. The girls thoroughly enjoy the course. During it they receive full basic pay, and the cloth they weave is part of the scheduled output of the factory.

The training period varies from girl to girl but is generally between four and eight weeks. When a girl is proficient she is put in charge of a loom in the training room. Her confidence rises steadily until one or two normal hazards, like thread breaks, are deliberately introduced

by the instructress. Once mastered, such troubles hardly affect her speed. Soon she is ready for the factory, where after only a few weeks she is producing as much as her workmates of long experience.

'Not the Thing'

In the past the company's main recruiting methods were to place small advertisements of vacancies in the local papers and to distribute brochures to headmasters and youth employment officers. But although Grant's labour turnover is low, these methods could not satisfy even their modest requirements. In Carnoustie—a holiday and golfing town of only a few thousand inhabitants—it was 'not the thing' for a girl to go into a factory if her intelligence and education fitted her for a job in shop or office, even if this meant travelling ten miles or more to Dundee in the south or Arbroath in the north.

Grants decided to stress the new training scheme in local newspapers. Applications began to trickle in. The

advertisements were repeated from time to time, and gradually word got around that to be accepted by Grants was something to be proud of, and that in addition to the minimum wage of £3 for a girl of 15 big bonuses could be earned after a short time. The trickle became a steady flow and soon the firm had to advertise that suitable applicants would be placed on a waiting list.

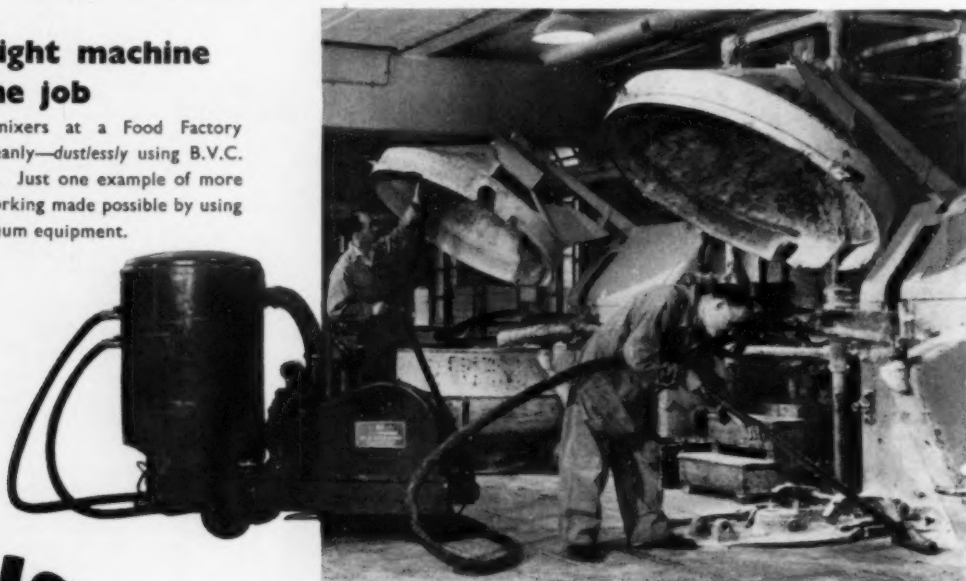
An outstanding feature was that some of the job-seekers were qualified typists. Grants had indeed proved that local prejudice against factory work could be broken down. This is largely because the girls appreciate the satisfaction of being trained for a specific and remunerative job in which exceptional workers can earn up to £9 a week.

One of the course's strongest champions is the shed foreman, a real traditionalist. His feelings towards it were made plain when he indicated, with a sweep of his hand, some of his less efficient workers and said: "Wait till we get cracking on these!"

END

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Cleaning mixers at a Food Factory quickly, cleanly—dustlessly using B.V.C. Model T64. Just one example of more efficient working made possible by using B.V.C. vacuum equipment.



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Automatic **SANITARY TOWEL MACHINES**

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ST36/2 £12.18.6
Capacity 136 packets

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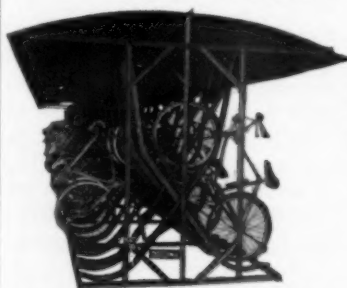
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Is Your Canteen in Top Gear?

By WINIFRED McCULLOUGH

Senior Canteens Adviser, Industrial Welfare Society

**So your canteen can't make ends meet ?
Turnover falling ? Customers disgruntled ?
Costs rising ? If so, don't give up. Check these
points to see what can be done.**

IF a canteen serves 100 dinners a day, and offers a choice of two hot courses, one cold, two sandwiches and three sweets, these are the prices which it would need to charge, without any form of subsidy, to recover the costs of raw materials, wages, labour, light replacements and fuel:

Main meal and two

vegetables . . .	1s. 6d. to 2s.
Sweet	3½d. to 6d.
Sandwich, whole, meat . . .	1s.
Sandwich, whole, cheese . . .	10d.
Cakes	3d. to 5d.
Tea	2½d.
Coffee	4d.

Portions would weigh as served: meat without bone, 2oz. Potatoes, 6oz. Second vegetable, 3oz. Pudding, 4oz. Tea, half pint, Coffee, 7oz. Raw materials for the meals would cost approximately 60 per cent of takings, leaving 40 per cent for other expenditure.

If the canteen is subsidized, the price paid by the customer plus the subsidy must come to something like

these figures, if good meals are to be served and costs covered.

A bigger choice of dishes, larger portions or a preponderance of the more expensive menu items send the actual costs soaring above average. A restricted choice, smaller portions and cheaper dishes will force it below.

But the latter course invariably leads also to a fall in turnover. If any 100-dinner canteen does better than this and still serves good meals, then it is perhaps helped by a big tea or cigarette sale, or by sales of cakes and sweets. And it is certainly run most efficiently.

Where to Look

Many canteens, however, have a subsidy and charge prices like these, but still cannot make ends meet. They should look at the following items with care:

- 1—Buying.
- 2—Issue of Stores.
- 3—Labour Costs.
- 4—Sundry Expenses.

Let us deal with these in detail.

Buying Are all goods purchased at the most advantageous prices? (Send for wholesale grocers' price lists. Check with other firms in the district etc.)

Are goods being purchased in sensible quantities? (Large consignments for foods with long life. Daily supplies only for fish, meat, and green vegetables. A month's fat, a week's butter, etc.)

Are goods ordered in a businesslike way with an official order form? Many firms have a list of approved suppliers and allow no unconfirmed verbal or telephoned orders.

Control of Stores Are goods checked on arrival and properly entered? All goods should be weighed and examined by a competent person.

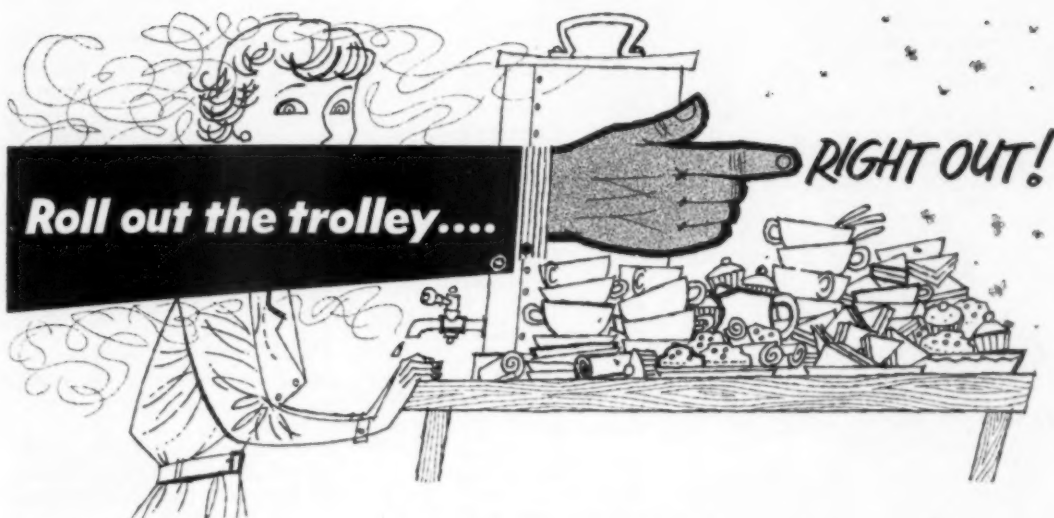
Are goods issued in a proper manner? Stores should be locked, except for the official issuing of goods to kitchen staff, who should sign for them.

Does the canteen supervisor take physical stock monthly and enter a stock sheet? Twice a year, a complete stock-check should be undertaken.

Stores should be cool and clean to prevent deterioration of foods. Nothing should be kept directly on the floor or in contact with walls. Are accurate scales and effective locks supplied?

Labour Costs Is the canteen over-staffed? A small canteen with morning and afternoon trolley rounds, main meals at midday, five or six office trays and a few overtime teas can be run comfortably enough by a cook/supervisor, an assistant cook, three general assistants and perhaps a part-time waitress for executives' lunch. A wage bill of roughly £31 weekly or 30 per cent of the probable weekly income (£100) is allowable.

If the staff numbers more than five for 100 main meals, then the whole job must be examined objectively to see if there is not, in fact, overstaffing. If numbers are right but the percent-



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Do You Satisfy Your Customers?

1. Is a variety of vegetables served? Does the menu rotate them? Or is it always 'chips and peas'?
2. Are many of the vegetables fresh?
3. Do potatoes seem to be the main food item? Did you know



age of wages is high, then a good deal of overtime may be worked or—more likely—the firm's wage policy is a generous one.

This is a fairly common difficulty. The canteen takings are no bigger when the canteen wages increase. Therefore the subsidy must be adjusted to meet general wage increases. Alternatively, of course, the prices must be raised.

Sundry Expenses Is a close watch kept on other outgoings? Are costs unreasonable for any one item?

Fuel should usually be about 2 per cent of canteen income, including subsidy. Replacement of china, cutlery, pans, linen, etc. should be 1½ per cent, laundry ½ per cent, stationery, soap, cleaning materials, etc. between 3 and 4 per cent.

Financial Efficiency

A canteen is like any other part of a business. It is a department that buys raw materials, processes them by various means into meals and beverages, and sells them to employees. If its accounts and budget are to be controlled accurately the following cash handling points should be observed:

Payments No cash payments, ex-

cept through the petty cash book, should be allowed. By making all accounts payable by cheque, full advantage can be taken of discounts, etc. and a very great measure of security is achieved.

4. What is the fruit position? Do you serve fresh fruit seasonally or are you mainly prune-fed?
5. Is milk available every day? Are eggs and cheese a part of every menu?
6. Is meat roasted and carved on the same day it is served?
7. How are vegetables prepared? Is soda added to the greens? Are they soaked too long and overcooked?
8. Is food kept warm by the hot-plate or is it dehydrated? How soon after cooking is food served?

Invoices should be checked and initialled by the canteen supervisor and passed to the accounts department within 48 hours of receipt. It is usual for them to be date-stamped by the postal department on receipt. A sum should be decided upon for monthly expenditure beyond which the accounts department must report to the person responsible as soon as possible. There may be a good reason for overspending, but as a general rule larger monthly cheques, unless equalled by even greater income, must be the subject of careful investigation.

Receipts Cash should be handled by as few people as possible. The modern cash register solves almost all problems, but where there are trolley rounds or tea points, simple but accurate record systems must be devised.

At the close of each day, a sheet should be completed, showing cash taken at each break, divided up into such sub-headings as "main meals," "beverages," "shop sales," "cigar-

ettes", etc. The total cash should be entered, handed to the firm's accountant for safe keeping and signed for by him.

A book should be kept for all guests' meals, free teas, etc., and should be signed by the person responsible at the actual time of the meals.

Salesmanship

The indifferent canteen supplies food. The good one *sells* it. Look out for these things when the canteen is visited:

► **Menu board** Is it attractive, well placed, readable? Are the descriptions of food appetizing?

► **Counter** Is it well laid out, sparkling with cleanliness, clearly displaying goods and prices? Is a sample meal laid out?

► **View across counter** Is the back counter area used as a shop window? Are glimpses of the kitchen pleasant? Are all mops, buckets, refuse bins well out of sight?

► **Atmosphere** Is the atmosphere brisk but friendly? Do customers ask for what they want, or is their attitude: "We wouldn't get it anyway?"

► **Personnel** Do canteen staff look clean and tidy? Are they well supplied with clean overalls? Do they have caps or head-scarves to keep hair in place?

Human Relations

Often, the canteen leads a life quite separated from the rest of the firm. Clearly this is a bad thing, and leads to high labour turnover. Here are some points to watch:

Has the supervisor been to a conference or a course in the past five years? Has she asked to do so and been refused, or has she been asked and said "No"?

How many of the canteen staff—or how few—belong to sports or social activities of the firm?

Has anyone tried to find out the real reasons for canteen staff leaving? Has something been overlooked which could make their lives easier?

END

BUSINESS



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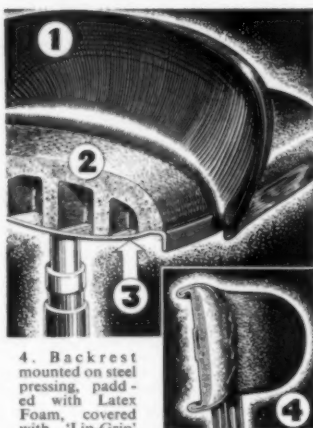
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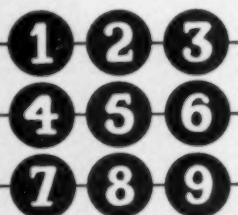
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PADDINGTON 6251

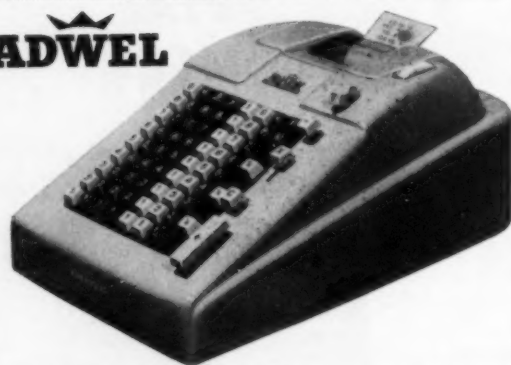
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There are two shelves. The top one holds the machine; the bottom



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one is for accessories. Dimensions are 15in. long by 10in. wide by 24in. high.

The distributors say that the trolley will stand up to the 'unfair wear and tear' which it is likely to get in a busy office.

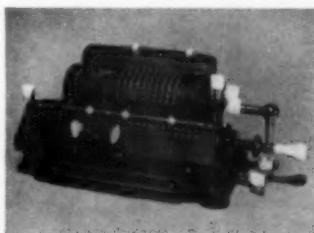
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London S.W.1*

One-hand Operation

TWO new models have been added to the *Schubert* range of calculating machines. They are the *CRV* (capacity 10 x 8 x 13) and the *CW* (capacity 6 x 6 x 11).

Basically, the *CRV* is the same as the established model *DRV*. Small,

compact and relatively low-priced, it can be operated easily with one hand. This is made possible by the provision



For quick calculating

of alternative left- and right-hand carriage shift levers to suit the operator's convenience.

Figures can be checked easily—and without eyestrain—by means of a top setting register. Short-cut calculations are made possible by the carry-over of decades throughout the result register and tens-transmission throughout the proof register. A back transfer lever allows figures to be transferred from the result register to the setting board in only two operations—a feature of great assistance when progressive calculations are being made.

The *CW* is basically the same as another established model, the *DW*.

*E. G. Solomon, 44 Worship Street,
London E.C.2*

Simpler Stock Control

THE *Relator* is a new stock control system which keeps detailed records of individual stock items and relates the consumption of each item to the total stock, without the use of calculations.

Principle of the system is that a set of control cards is mounted on a visual board so that comparisons can

be made made between individual items. The manufacturers say that a speed of 5,000 entries per day, spread over 2,000 items, can be achieved.

Two models of the *Relator* are in production. The first is a manually-controlled machine which brings the control cards before the operator for entry purposes and restores them to their correct filing sequence. The other machine automatically makes



5,000 entries a day

entries and collates information posted to a series of registers. The number of registers can be arranged to suit individual requirements.

Edward A. Jones Ltd., 32 Deansgate, Manchester 3

'Revolutionary' Clock

OPERATING on a completely new principle, the *Kienzle* automatic clock is claimed to combine the advantages of electric and key-wound clocks—without any of their disadvantages. The principle is that a special spring mechanism is automatically wound up, at intervals of 30 seconds, by electric charges from a standard torch-type battery.

The clock has no wires or plugs, and is not affected by power fluctuations. Its running costs are said to be lower than those of an electric clock. A battery lasts about nine

Business EQUIPMENT SURVEY

months, and there is no loss of efficiency as it nears the end of its life.

One advantage is that the *Kienzle* can be fixed in awkward places (for example, near the top of a high



Wound by battery power

wall) where it would be difficult to position an electric or a key-wound clock.

Models are available for all purposes. They range from simple, inexpensive clocks for factories and canteens, to more ornate designs for offices and boardrooms.

Metro Duplicator Supply Co. Ltd., 57 Holborn Viaduct, London E.C.1

Special Storage Register

A NEW feature has been added to the *Archimedes* calculating machine *Model 1 DS*. It permits automatic calculation in many cases where previously several operations had to be performed or intermediate answers written down.

The feature is a special storage register which enables figures to be



Versatility extended

accumulated while further calculations are made, so speeding up the work. Accumulated calculations can be transferred back from the storage register to the product register.

In no way has this feature complicated the machine's operation, which still retains the short-cutting principle. Multiplication and division are automatic, and an unskilled operator can be trained to use the machine in a short time. Two capacities are available: 8 x 7 x 15 x 15, and 9 x 9 x 18 x 18.

Archimedes-Diehl Machine Co. Ltd., Chandos House, Buckingham Gate, London S.W.1

Copying Problem Solved

THE new range of *Marathon* coloured typewriter ribbons has been developed especially for typing matter which is to be reproduced by the *Secretary* copying machine. Although the *Secretary* can copy (without inks, stencils or chemical processes) almost any printed, written or typewritten material, it does not always react well to some coloured inks, particularly red. The new ribbons overcome this difficulty.

Available in blue, red, green and brown, they are also excellent for ordinary correspondence work. Although they cost no more than standard ribbons, they are 15 yards long instead of 12 yards.

Columbia Ribbon and Carbon Manufacturing Co. Ltd., 62 Shaftesbury Avenue, London W.1

Typist's Copyholder

SIMPLY constructed and comparatively inexpensive, a new copyholder incorporates a metal spring which indicates the line from which the typist is copying. It also ensures that the indicator does not slip out of alignment.

The holder can take both quarto and foolscap paper, and stands 14in. high. It is finished in hammer grey enamel. Rubber feet prevent it from scratching the table or desk.

An optional extra is a plastic magnifier which fits over the metal strip. This vertically enlarges the

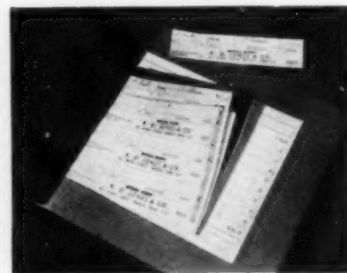
line being copied, so making it more easily readable.

Power Equipment Co. Ltd., Kingsbury Works, Kingsbury Road, London N.W.9

Faster Receipting

DESIGNED for use where security and convenience are prime considerations, the *Cakebread* Receipting System 1956 produces cash sheet and receipt at a single writing (plus playing in slip if required).

Receipts and cash sheets, together with the carbon, are made up into a multiple set, in which the receipts are already registered with the appropriate space on the cash sheet and linked to it by a system of numbering. Thus all receipts are accounted for



Designed for security

by an entry on the cash sheet, and the set is more compact and easier to handle.

Two basic layouts are available. For outside use, each set consists of 10 receipts and a cash sheet, fitted in a holder which can be carried easily and used without the support of a desk. The second model, for indoor use, contains 20 receipts in each set and provides an analysis if required.

C. Cakebread Ltd., Baches Street, London N.1

Repetitive PA System

BY reproducing messages pre-recorded on tape, the new *Repetina* provides an unattended public address system. A message can be relayed once only, or repeated as often as desired.

Announcements are made into the recording unit, which automatically rewinds the tape, ready to repeat the recorded message as a check for



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and at 11 Peter Street, Manchester, 2. Tel: Blackfriars 6384/5

'Recordak' is a registered trade-mark.



Several thousand documents can be recorded on each 100 ft. reel of microfilm.

Business EQUIPMENT SURVEY

accuracy. The control unit is then set for either single or continuous transmission.

The *Repetina* is intended for speech transmission only. Announcements



Plays 15-second messages

can be made up to a duration of 15 seconds.

Any number of repeater units can be linked to a single recording unit.
Southern Instruments Communications Division, Frimley Road, Camberley, Surrey

Desk 'Pulling' File

ALMOST 1,000in. of filing space is provided in a double-pedestal 'pulling' desk designed especially for users of pre-punched cards. The unit houses the maximum number of cards that one operator can handle efficiently when seated, and provides a card-per-unit filing system which accommodates 140,000 40-column cards. Flexibility in card layout is combined with speed and simplicity in card 'pulling.'

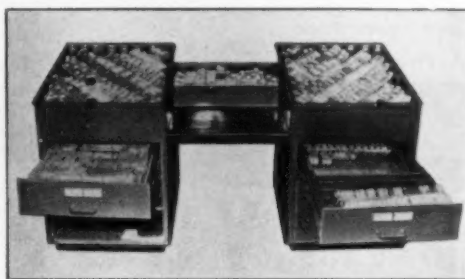
The desk contains trays designed

to house either 36- or 40-column cards or 65- and 80-column cards. The top trays are removable and can be used either flat or in a tilted position. The centre tray is also removable, allowing ample space for documents as well as filing space for spare trays.

When not in use the file closes readily, and is dust-proof. It measures 71in. by 24in. by 29in.

Powers-Samas Accounting Machines (Sales) Ltd., Powers-Samas House, Holborn Bars, London E.C.1

Accommodating up to 140,000 punched cards, this 'pulling' desk closes readily when not in use and is dustproof



ADLER

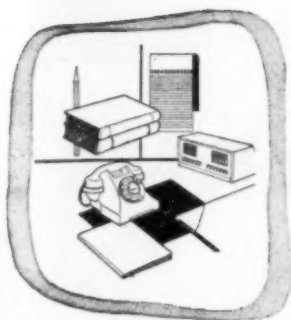
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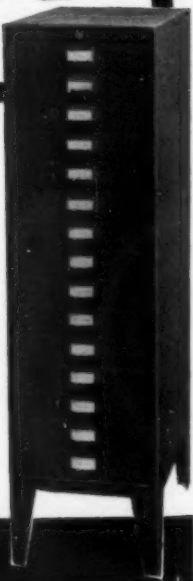
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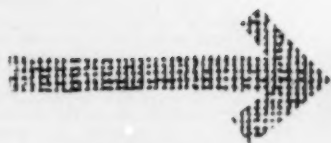
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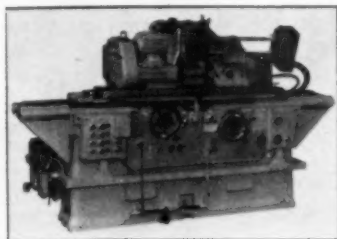


INDUSTRIAL EQUIPMENT

Cylindrical Grinder

CAPABLE of dealing with workpieces of awkward shapes, the Model 1215 cylindrical grinding machine covers many of the more difficult toolroom tasks.

The wheelhead spindle has a large



Deals with awkward shapes

scale. The wheel spindle is centre-driven, but the design overcomes the difficulty of belt-changing usually associated with a drive of this type.

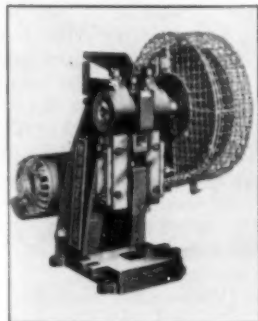
The wheel-supporting column is designed to accommodate a pantographic truing arrangement. Provision is made for an optical projection unit for observing and measuring the outline of the work.

A. A. Jones and Shipman Ltd., Narborough Road South, Leicester

Bench Power Press

PRIce of the new Worcester Type 2C bench power press is actually lower than that of its predecessor. Its capacity is 2 tons.

Among the new features are op-



Price reduced

tional fixed strokes of $\frac{1}{2}$ in. or $\frac{1}{4}$ in. ram adjustment of $\frac{1}{2}$ in., and a heavier flywheel. The hole in the bed is 2 in. square and the net weight, motorized, is 1 cwt. 3 qrs.

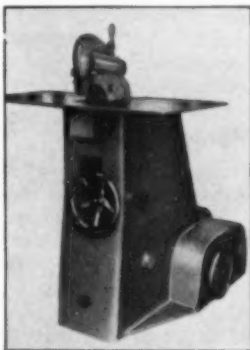
Jones and Attwood Ltd., Stourbridge, Worcs.

Flange Former

WITH the appropriate tools, the Besco Model H.S. will perform a comprehensive range of forming and flanging operations on sheet metal up to 12 s.w.g.

Flanging is done by the oscillation of a short brakehead tool at speeds of either 213 or 426 strokes a minute, the angle being controlled from the front of the machine. The maximum height of flange is 1 $\frac{1}{2}$ in.

While passing through the forming



For sheets up to 12 s.w.g.

head the workpiece is supported by a table 36 in. long by 21 in. deep. There are 'slow' and 'fast' controls and a complete set of tools for a given gauge or flange is supplied.

F. J. Edwards Ltd., 359-361 Euston Road, London N.W.1

Versatile Band Cutter

TEN speeds and an 18-in. throat capacity are the main features of a new band machine for repetitive operations—involving sawing, slicing, parting, and slotting—in materials ranging from die steel to aluminium and rubber.

Welding and annealing apparatus is incorporated for making band



Ten cutting speeds

tools from 'coil' stocks. There are also a spotlight and an air jet.

From the built-in job-selector dial the operator can see at a glance the best speeds and saw data for machining different materials.

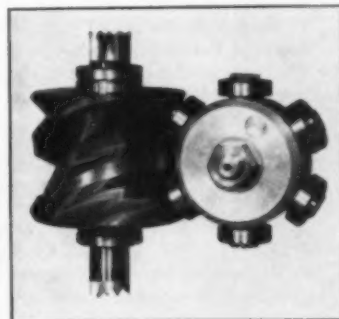
Startrite Engineering Co. Ltd., Waterside Works, Gads Hill, Gillingham, Kent

Fast Index Gear

A NEW index gear should remove one of the main obstacles to the wider application of indexing turrets—the fact that, for mechanical reasons, their operating speed is normally low.

The new gear, the Mark 2, is capable of an indexing speed of more than 750 'operations' a minute, a considerable advance over previous models. Indexing times of 25 to 100 per cent of the cycle can be achieved. The mechanism is specially suitable for packaging machines.

Standard, easily-replaced ball races



750 'operations' per minute

Business EQUIPMENT SURVEY

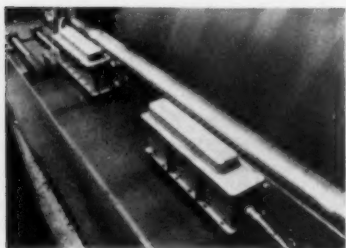
are used for the roller-followers, which are among the few moving parts. The mechanism is simple and sturdy as there are only two co-operating elements. The only complex component is the cam, with its intricate three dimensional profile; this is a worm of varying pitch, with part of the thread straight.

Manifold Machinery Co. Ltd., 660 Great Cambridge Road, Enfield, Middlesex

Thickness Gauge

ONE of the most important factors which has to be controlled during the manufacture of sheet materials is thickness. A new and convenient instrument for measuring this is the *Beta* gauge.

It has several advantages over other devices. Indication is continuous, may be displayed at several



Continuous indication

positions remote from the measuring point, and may also be recorded. No physical contact is made with the material. Measurement may be averaged over a large area for production control, or confined to a small one for rigorous inspection. The gauge can be made to adjust controls automatically.

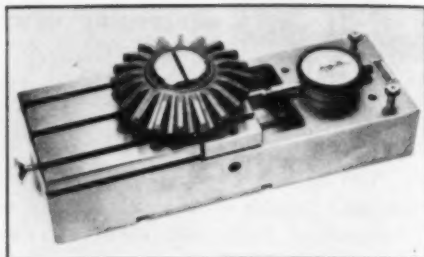
The sheet to be measured is made to interrupt a radiation beam and the thickness is calculated from the amount of attenuation in the beam as it passes through the sheet.

Isotope Developments Ltd., Beenham Grange, Aldermaston Wharf, nr. Reading, Berks.

Simpler Measuring

SOME engineering measurements cannot be performed with ordinary gauges—for instance, the measurement of internal gears, external

The *Ten-Fifty Check-master* measures accurately and quickly internal gears, splines, and the effective diameter of screw threads



splines, shallow external grooves, or of the effective diameters of screw threads.

Measurements like these often call for special tools, or adaptations of standard tools. But all of them can be made with the *Ten-Fifty Check-master*.

This instrument, made of cast iron, contains a frictionless transmission unit which holds the measuring anvil. In use, the transmission is in contact with the dial indicator by means of an adjustable datum stop. The interchanging of anvils is simple.

The illustration shows the *Ten-Fifty*, set for checking the effective diameter of the splined bore of a bevel gear.

British Indicators Ltd., Sutton Road, St. Albans, Herts.

Wide Spray Nozzle

THERE is a degree of inefficiency in conventional spray nozzles because the air-control parts are opposed. Two air streams strike each other directly and much of the energy of the main stream is lost.

A tangential nozzle has been developed in which the nozzle horns are set at an angle to each other and the kinetic energy of the main stream is preserved. It can provide a wide spray with maximum coverage per

pass of the gun, breaking up the paint with the minimum consumption of air at minimum pressure.

Using the new nozzle, it is often possible to reduce air pressure from 50lb. to 5lb. per square in., with improved performance and savings in air and paint.

Alfred Bullows and Sons Ltd., Long Street, Walsall, Staffs.

Cheap Carton Forming

LABOUR costs of packaging can be considerably reduced, it is claimed, by using the *Foldmaster*. This forms cartons at the rate of about 1,250 per hour. Only one unskilled operator is needed.

The machine can be rented from the agents for 10s. a week. They also supply the carton material. The system is cheap because assembly costs are drastically reduced.

The *Foldmaster* is small, made largely of wood, and driven by compressed air.

Abbey Display Co. Ltd., 49 Charles Street, Berkeley Square, London W.1

'Adhesive-less' Tape

THE disadvantages of some adhesive plastic tapes under certain combinations of humidity and temperature are widely known. The tape itself remains serviceable, but the adhesive coating 'spreads' or perishes.

A new tape called *Dilec* has no sticky coating, the adhesive quality being incorporated in the base material. This facilitates clean and efficient use. Of glossy, black P.V.C., it can be heat-sealed, cemented or high-frequency welded.

Its main uses are in electrical fields (cable-stripping, jointing and busbar lapping) where its adhesion to metal is of great value.

John Goshon and Co. Ltd., Packaging Tape Centre, Albert Embankment, Vauxhall, London S.E.1



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... "Down at Bitsanpieces Ltd. that was—half the stuff not even labelled—put me out for the rest of the day, it did!"

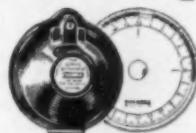
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Two-way Cooking

WITH the new *Redring* boiler-griller a common grill fault is eliminated—concentration of heat at the centre of the element. At the same time, the unit's boiling efficiency is claimed to be double that of the conventional dual-purpose cooking element.

Secret of its high performance is a special two-level arrangement of the heating rods. This results in a



Two-level element

greater concentration of heat at the outer edges, where heat losses are normally greater.

Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17

Safety-pin for Eggs

EGGS are prevented from cracking and boiling out by the *Humpty* egg piercer—a simple little gadget made of plastic. It consists of a small egg holder, with a spring-loaded pin at the base. When the egg is pressed gently into the holder it is pierced by the pin. This releases the air inside the egg and prevents cracking through expansion.

Intarsia Ltd., 77 Carlton Vale, London N.W.6

Carver's Delight

MANY carving forks are singularly ill-suited to the purpose for which they are allegedly designed. Now a manufacturer has had second thoughts on the subject, and has



Lifts away cleanly

come up with the *Kithurst*. Instead of having two large prongs, it grips the meat with short spikes set in an oval plate. It is claimed to lift away cleanly without tearing.

The *Kithurst* is well finished in heavy chrome. A catering model will be on sale shortly.

Kithurst Products Ltd., Commerce House, South Street, Lancing, Sussex



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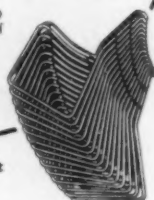
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REDRO NESTING CHAIRS are constructed of $\frac{3}{4}$ in. or $\frac{1}{2}$ in. high quality tubular steel, designed to give the maximum comfort for normal seating.

The chairs are light to handle, easy to keep clean, and when not required for use, are economical in storage space. Nesting one upon another, a stack of 15 chairs occupies a space only 18 in. wide by 3 ft. deep.

The REDRO NESTING CHAIR is available in 12 colours of stove enamel, and fitted with 9 different types of seats and back which meet with most specialised requirements.

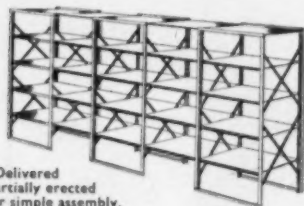
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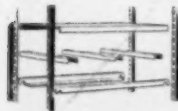


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PLANNING A WORKS PENSION SCHEME

Continued from page 73

Under a voluntary scheme of this type, a man of 30 who contributes 2s. a week until he is 65 will receive a tax-free lump sum of £245. At the guaranteed minimum rate, this would produce an annual pension of £23 5s. The death benefit, if the employee dies before he is 65, will equal the full sum assured by his contributions.

Life Cover

The payment of lump sums for any purpose is severely curtailed in schemes approved under Section 379 of the 1952 Act. But the Revenue generally allow death benefits of up to one year's wages—which satisfy the requirements of many works schemes.

Where pensions are based on the purchase of deferred annuities, this form of assurance is usually combined with a group life insurance policy. All employees who are eligible to join the pension scheme are accepted on equal terms, provided that they are not sick on the commencing date. As a rule, the rates are appreciably lower than those which the employees would have to pay individually for the same cover.

Endowment assurance schemes give substantial cover, since a sum equal to the full benefits assured is paid if an employee dies at any age before retirement. Thus the proportionate cost of death benefits is generally higher than in schemes which depend on group life insurance. On the other hand, the incentive value to the younger men—especially those who are married and have children—is also much higher.

The attention paid to this aspect of industrial schemes has increased steadily during the past 20 years. In addition to death benefits, most schemes now include a widow's option, enabling an employee to choose a smaller pension which, however, will be paid as long as either he or his wife lives. A few extend the same principle to other dependants. *END*

BUSINESS

COMBINING 'GOOD LOOKS' WITH GREATER EFFICIENCY

Continued from page 77

of 'catching them young,' the A.D.O. aims part of its propaganda at senior personnel responsible for design. By doing so, it hopes to make a deeper impression—and get results more quickly—than would be the case if it concentrated on the company's apprentice training schemes. During the winter months it arranges a short series of lectures for engineers and draughtsmen, who attend on a voluntary basis.

A more concentrated form of training is the series of 'experimental aesthetics' courses which are held once or twice a year. For these, the A.D.O. selects about 12 men, mainly from names submitted by departmental chiefs.

New Thinking

Each course involves 12 evening sessions. The syllabus includes subjects like 'spatial relationships,' 'form' and 'balance,' and a number of projects are undertaken, the men producing models in plasticine, wood and plaster. The emphasis on theory suggests—correctly—that the aim of the course is not as much to show the students how they can improve the appearance of specific types of equipment, as to help them to develop a new sort of 'thinking.' Through activities of this sort, the company hope to establish in all departments a small core of appearance design enthusiasts. In a more specialized course, which was run for the first time recently and is to be repeated soon, the redesign of a piece of company equipment is undertaken in conjunction with the design consultant and a liaison engineer from the department concerned.

But the value of 'spreading the gospel' to apprentice draughtsmen (who now have their own training school) is not overlooked. At various stages of their training the boys get special talks and demonstrations by members of the appearance design office. Later, this side of the A.D.O.'s education programme will probably be developed.

END

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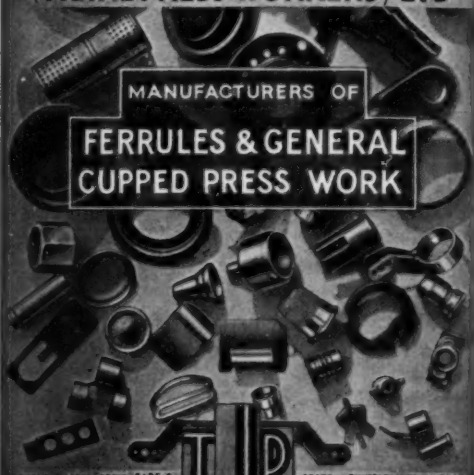
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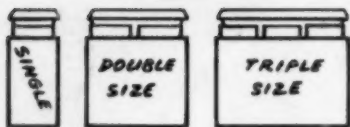
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